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Message of the President of the United States, to the  
two Houses of Congress at the commencement of  
the first session of the Thirty-fifth Congress :  
Report of the Secretary of War, 1857

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MESSAGE

OF THE

PRESIDENT OF THE UNITED STATES,

TO THE

TWO HOUSES OF CONGRESS

AT THE

COMMENCEMENT OF THE FIRST SESSION

OF

THE THIRTY-FIFTH CONGRESS.

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JANUARY 4, 1858.—*Resolved*, That the usual number of copies, and fifteen thousand additional copies, of the Annual Message of the President of the United States and accompanying documents be printed for the use of the Senate.

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1858.





## REPORT OF THE SECRETARY OF WAR.

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WAR DEPARTMENT,  
*Washington, December 5, 1857.*

SIR: I have the honor to submit the following report of the condition and operations of the army during the past year.

The army consists of nineteen regiments, divided into ten of infantry, four of artillery, two of dragoons, two of cavalry, and one of mounted riflemen. The whole strength of the army, as posted, consists of about 17,984 men; and the actual strength, on the first of July last, was 15,764. In addition to the movements which the troops have been called on to make this year, which are set forth in a separate paper, prepared by the Adjutant General and herewith transmitted, this force is called upon to garrison 68 forts of a large and permanent character, so far, at least, as it is possible to supply men for the purpose; and to occupy 70 posts less permanently established, where the presence of a force is absolutely required. The area over which these forts and posts are spread embraces a circuit of about 3,000,000 square miles, and requires a journey of many thousand miles to visit the principal ones of them.

The external boundary of our country, requiring throughout a more or less vigilant military supervision, is 11,000 miles in length, presenting every variety of climate and temperature, from the inclement cold of our Canada frontier to the tropical regions of southern Texas. But the occupation of this long line of frontier is a trifling difficulty in comparison with that of protecting the double line of Indian frontier, extending from the Lake of the Woods to the banks of the Rio Grande, on the east side of the Rocky mountains, and from beyond the river Oregon on the British frontier to the head of the Gulf of California, on the western slope of those mountains. Superadded to these lines, requiring to be occupied, are the great lines of intercommunication between the valley of the Mississippi and the Pacific ocean, which imperatively demand that protection which only the United States troops can furnish. These lines are very long, and are now extremely important, whilst every year renders them more and more so. From our western frontier of settlements to those of northern Oregon the distance is about 1,800 miles; from the same frontier to the settlements of California, *via* Salt Lake, is 1,800 miles; from the frontier of Arkansas, at Fort Smith, by Albuquerque or Santa Fé, to Fort Tejon, is about 1,700 miles; and from San Antonio, by El Paso, to San Diego, near the borders of the white settlements, is 1,400 miles; constituting an aggregate line of 6,700 miles which ought to

be occupied, and which we pretend, in some sort, to keep open and defend.

This simple statement of facts demonstrates, stronger than any arguments could do, the absolute necessity for an increase of the army.

The policy of our government, and the spirit of our people, are alike opposed to a large standing army, and very properly so; but if an army is needful at all, it should be organized in such manner as to answer the purposes for which it is required. Its numbers should correspond with the service it is intended to perform. If from any disproportion in this respect it stops short of efficiency, it becomes insignificant, and entails upon the country expenditures wholly incommensurate with any service it can render.

It will not be denied that an army, properly organized and of sufficient strength, constitutes at once the cheapest and most efficient means by which the indispensable services it is designed to perform can be secured by the government.

There is no substitute for an army; and to render it at once economical and efficient, adequate numbers are essential. If there is a higher duty than another devolved upon a well regulated government, it is to afford perfect protection to its citizens against outrage and personal violence; yet this great obligation is not performed by the government of the United States. For a large portion of the year, scarcely a week elapses without bringing to us intelligence of some Indian massacre, or outrage more shocking than death itself; and it most frequently happens that these acts go unpunished altogether, either from the want of troops for pursuit, or from their remoteness from the scenes of slaughter, which renders pursuit useless.

In former times, when the hardy pioneer was allured away from the line of white settlements by fertile lands alone, he scarcely ventured so far as to be beyond succor and protection from those he left behind. But far different is the state of things at present. Our Pacific settlements, with their great inducements of rich lands, salubrious climate, and fabulous mineral treasures, present to the inhabitants of the Atlantic States temptations to emigration which the privations of an intervening wilderness and desert, and continual danger from roving bands of savages hanging upon their march for many hundred miles together, cannot deter them from undertaking. This migration strengthens the natural ties between the Atlantic and Pacific States, and adds immensely to the defensive strength of that remote region. Justice and humanity alike demand protection for these emigrants at the hands of our government.

To render governmental protection to our vast frontier and emigration perfect, a very large augmentation of the army would not be required. Five additional regiments would answer the purpose if properly posted.

It will be seen from a paper carefully prepared from reliable data by the Adjutant General, that no increase of our forces is so efficient, or near so cheap, as the augmentation of our regular army.

A line of posts running parallel with our frontier, but near to the Indians' usual habitations, placed at convenient distances and suitable positions, and occupied by infantry, would exercise a salutary

restraint upon the tribes, who would feel that any foray by their warriors upon the white settlements would meet with prompt retaliation upon their own homes. In addition to this means of defence, there should be concentrated along our own frontier, at eligible points, large bodies of efficient horse, all or any portion of which could, upon the opening of spring and the first appearance of grass, march to punish aggression or repress any spirit of insubordination. These cantonments for cavalry should be established at points where corn and hay are abundant and cheap. The present is a favorable period for the choice of permanent locations, for the reason that upon a large portion of our northwest frontier, particularly, settlements have nearly reached the limits of cultivable lands, beyond which, while there are spots of rich soil and tolerable pasturage, they are not sufficient for extended settlement. Hence there is no likelihood of military stations being left, as heretofore, in the heart of a thickly populated country, after the lapse of a very few years. The posts selected in the manner now indicated would become useless only when the Indian tribes ceased to be formidable, or disappear altogether, for they would be upon the line of permanent frontier, which has now been reached.

The concentration of these large bodies of horse at eligible points upon our borders would have the best influence both upon the discipline and effectiveness of the corps. Throughout the winter, when field operations were impossible, the men could be perfectly drilled, and the horses would be put in complete order for the most active and arduous service in the earliest spring. This double line of defence would constitute a perfect protection to the settlements, in the first place, and would soon prove far the most economical system of frontier protection, because it would greatly diminish and cheapen the transportation of military stores and munitions of war, which is now the chief source of our most unsatisfactory frontier expenditure. The infantry stations would not necessarily be large, and supplies could be furnished them from convenient points at very moderate rates.

For these reasons, and many others which readily suggest themselves, I venture to submit to you the propriety of asking from Congress an increase of the army. I am strengthened in my convictions of its propriety from the recommendations of my predecessor, whose thorough knowledge of the army and its requirements give his opinions great weight, and from the recommendations, also, of the general in chief.

The army has been very actively and constantly engaged in the performance of arduous and important duties. The Indian war in Florida claimed the attention of a strong force, composed mainly of the fifth infantry and fourth artillery, during the spring and early part of the summer. This war has been prosecuted with all the vigor which the character of the country and that of the enemy would admit of. The country is a perpetual succession of swamps and morasses, almost impenetrable, and the Indians partake rather of the nature of beasts of the chase than of men capable of resisting in fight a military power. Their only strength lies in a capacity to elude pursuit.

Exigent affairs in the west demanded the removal of those two regiments from Florida to the Territory of Kansas; but they have

been replaced by volunteers, and the pursuit of the Indians has been continued by the latter troops up to the present time. The services rendered by these volunteer troops have been spoken of in terms of merited commendation in the reports of officers in command.

Two very important and momentous subjects forced themselves upon the attention of this department at an early period of my incumbency. These were the complications growing out of the troubles in the Territory of Kansas, and the still more involved and difficult relations borne by the Territory of Utah towards this government. The latter has recently assumed a very threatening attitude, of which I will presently speak.

The very anxious and earnest representations of danger to the public peace which were made by the governor of Kansas, growing out of exasperations between the different political parties there, and his earnest call for a large body of troops, required the transfer of the tenth regiment of infantry and the fourth regiment of artillery to Fort Leavenworth, and also the recall of Colonel Sumner's command, then in the field, and that engaged in marking the southern boundary of Kansas, under the command of Lieutenant Colonel Johnston, of the first cavalry. From other quarters, likewise, troops were moved to Kansas, until a force was concentrated there sufficient, in the opinion of the governor, to repress all insubordination and to insure the peace of the territory. The result has fully answered the expectations of that distinguished functionary. The peace of Kansas has been undisturbed.

The requisite provision, however, for this desirable object, agreeably to the wishes of the governor, necessitated a very important modification of the plans then already determined upon with regard to the movement of troops to Utah. A large portion of both horse and foot, intended for this distant service, was detached and remained behind, leaving the expedition to proceed with the fifth and tenth infantry, the batteries of Captains Phelps and Reno, with a part of the second dragoons, which followed long after the head of the column had set out on the march.

#### UTAH AND THE EXPEDITION THITHER.

This subject has very recently assumed so extraordinary and important an attitude, that I deem it proper to dwell upon it somewhat more at length than, under other circumstances, would have been required.

The Territory of Utah is peopled almost exclusively by the religious sect known as MORMONS. From the time their numbers reached a point sufficient to constitute a community capable of anything like independent action, this people have claimed the right to detach themselves from the binding obligations of the laws which governed the communities where they chanced to live. They have substituted for the laws of the land a theocracy, having for its head an individual whom they profess to believe a prophet of God. This prophet demands obedience, and receives it implicitly from his people, in virtue of what he assures them to be authority derived from revelations re-

ceived by him from Heaven. Whenever he finds it convenient to exercise any special command, these opportune revelations of a higher law come to his aid. From his decrees there is no appeal; against his will there is no resistance. The general plan by which this system is perpetuated consists in calling into active play the very worst traits of the human character. Religious fanaticism, supported by imposture and fraud, is relied on to enslave the dull and ignorant; whilst the more crafty and less honest are held together by stimulating their selfishness and licensing their appetites and lusts. Running counter, as their tenets and practices do, to the cherished truths of Christian morality, it is not to be wondered at that, wherever these people have resided, discord and conflict with the legal authorities have steadily characterized their history.

From the first hour they fixed themselves in that remote and almost inaccessible region of our Territory, from which they are now sending defiance to the sovereign power, their whole plan has been to prepare for a successful secession from the authority of the United States and a permanent establishment of their own. They have practised an exclusiveness unlike anything ever before known in a Christian country, and have inculcated a jealous distrust of all whose religious faith differed from their own; whom they characterize under the general denomination of GENTILES. They have filled their ranks and harems chiefly from the lowest classes of foreigners, although some parts of the United States have likewise contributed to their numbers. They are now formidable from their strength, and much more so from the remoteness of their position and the difficulty of traversing the country between our frontiers and Great Salt Lake. This Mormon brotherhood has scarcely preserved the semblance of obedience to the authority of the United States for some years past; not at all, indeed, except as it might confer some direct benefit upon themselves, or contribute to circulate public money in their community. Whenever it suited their temper or caprice, they have set the United States authority at defiance. Of late years, a well grounded belief has prevailed that the Mormons were instigating the Indians to hostilities against our citizens, and were exciting amongst the Indian tribes a feeling of insubordination and discontent.

I need not recite here the many instances in their conduct and history on which these general allegations are founded, especially the conduct they have adopted within the last twelve months towards the civil authorities of the United States.

It has, nevertheless, always been the policy and desire of the federal government to avoid collision with this Mormon community. It has borne with the insubordination they have exhibited under circumstances when respect for their own authority has frequently counselled harsh measures of discipline. And this forbearance might still be prolonged, and the evils rife amongst them be allowed to work out their own cure, if this community occupied any other theatre, isolated and remote from the seats of civilization, than the one they now possess. But, unfortunately for these views, their settlements lie in the great pathway which leads from our Atlantic States to the new and flourishing communities growing up upon our Pacific seaboard.

They stand a lion in the path ; not only themselves defying the military and civil authorities of the government, but encouraging, if not exciting, the nomad savages who roam over the vast unoccupied regions of the continent to the pillage and massacre of peaceful and helpless emigrant families traversing the solitudes of the wilderness. The rapid settlement of our Pacific possessions ; the rights in those regions of emigrants unable to afford the heavy expenses of transit by water and the isthmus ; the facility and safety of military, commercial, political, and social intercommunication between our eastern and western populations and States, all depend upon the prompt, absolute, and thorough removal of a hostile power besetting this path midway of its route, at a point where succor and provisions should always be found, rather than obstruction, privation, and outrage. However anxiously the government might desire to avoid a collision with this or any other community of people under its jurisdiction, yet it is not possible for it to postpone the duty of reducing to subordination a rebellious fraternity besetting one of the most important avenues of communication traversing its domain, and not only themselves defying its authority, but stimulating the irresponsible savages hovering along the highway to acts of violence indiscriminately upon all ages, sexes, and conditions of wayfarers.

From all the circumstances surrounding this subject at the time, it was thought expedient during the past summer to send a body of troops to Utah with the civil officers recently appointed to that Territory. As the intention then was merely to establish these functionaries in the offices to which they had been commissioned, and to erect Utah into a geographical military department, the force then despatched and now en route to the Territory was thought to be amply sufficient for those purposes. Supplies were abundant there, and the position was favorable for holding the Indians in check throughout the whole circumjacent region of country. It was hardly within the line of reasonable probability that these people would put themselves beyond the pale of reconciliation with the government by acts of unprovoked, open, and wanton rebellion. It will be seen, however, from the documents accompanying this report, that flagrant acts of rebellion have been committed by them, in the face of positive assurances given them that the intention of the government in sending troops into the military department of Utah was entirely pacific.

Great care had been taken, in preparing for the march to Utah, that nothing should seem to excite apprehension of any action on the part of the army in the least conflicting with the fixed principles of our institutions, by which the military is strictly subordinate to the civil authority. The instructions to the commanding officer were deliberately considered and carefully drawn ; and he was charged not to allow any conflict to take place between the troops and the people of the Territory, except only in case he should be called on by the governor for soldiers to act as a *posse comitatus* in enforcing obedience to the laws.

In conformity with this sentiment, and to assure these people of the real intention of the movement, an active, discreet officer was sent in advance of the army to Utah for the purpose of purchasing pro-

visions for it, and of assuring the people of the Territory of the peaceful intentions of the government. This duty was faithfully performed; the chief men of the fraternity were assured that no violence was intended towards them or any one, and that nothing could be further from the intention of the government or the army than to molest any one for their religious opinions, however abhorrent they might be to the principles of Christian morality. This officer found, upon entering the Territory, that these deluded people had already, in advance of his arrival, or of any information, except as to the march of the column, determined to resist their approach and prevent, if possible, and by force, the entrance of the army into the valley of Salt Lake. Supplies of every sort were refused him. The day after his departure from the city, on his way back, Brigham Young issued his proclamation, substantially declaring war against the United States, and, at the same time, putting the Territory under martial law. The facts connected with this mission of Captain Van Vliet will appear more in detail from his reports, herewith transmitted.

In view of the menacing attitude of affairs in Utah, and of the importance of a prompt and thorough suppression of the spirit of rebellion reigning there, I must repeat my recommendation of five new regiments, which I am persuaded is the very smallest addition to the army which the exigencies of the service will allow.

#### THE STAFF.

Attention has been repeatedly called to defects in the organization of the army, and to various details in reference to several of its parts. As these evils increase with time and practice under them, I must again bring them before you.

The basis of our existing system is the British army as it served in the colonies before the revolution, retaining many of the defects, since corrected in Great Britain, under the experience and necessities of long wars. Provisions inconsistent with the existing system, copied from other nations, and partial legislation designed for particular interests, have augmented these evils, and we have committed the fault of adapting our fundamental organization to a time of peace, instead of basing it on the exigencies of war.

One of the greatest errors of detail is the separate, independent character of our staff corps. This removes them from their proper position as aids or assistants to the commander, and constitutes them his equals. It contracts the sphere of observation and experience, and thus unfits the officer for change or advancement, and begets an accumulation of precedent and prerogative at war with the vital principle of military organization—the inviolable and undivided authority of the head. He is bound, as they are, by the law, and his construction of it should govern them, not theirs him.

Another defect is the uncertain and ill-defined rights of brevet rank. We have adopted the word, but not its signification, from the English rule, and applied it to circumstances not contemplated or existing when first established. Repeated decisions and imperfect



legislation have only increased the evil by inviting new discussions and adopting new constructions.

We have retained another fault, abandoned, at least practically, in almost every service among civilized nations, even the most aristocratic and monarchical. This is promotion by seniority. Age and experience should bring excellence; but the test lies in the actual possession of the latter, and not merely in the circumstances which it is assumed should produce it. Seniority, with the requirements essential for position, ought certainly to give precedence; but without these, that dignity and respect which belong to rank and command can never be secured.

All that has been urged in favor of retaining it with us is the danger of political or personal favor governing a selection. There may be danger from this source, but, by the rule of seniority, the *worst* officer of any arm *must*, if he lives, come to be one of the most important and responsible officers under the government—the colonel of a regiment. By selection, it is possible that the very best may not always be chosen, though the chances are in favor of this hypothesis; but certainly the very worst never will be, and this is surely a gain on the present rule.

To correct these and other evils, I would urge so to provide by law for the construction of the regiments of horse, artillery, and infantry, as to approach them, as far as our circumstances require, to the practice of all nations long experienced in war, and so as to admit their contraction for peace and their re-expansion in war without altering this basis.

This can be done without any increase of officers or men, or augmentation of expense, by merely arranging those already in service and the companies of each corps to suit the end proposed.

To place the staff in proper relation to the rest of the army, the law should collect all the officers doing that branch of duty into one corps, to be assigned by authority of the President to such duties as each may seem to be best fitted for, securing to each the rank and relative position he now holds. But, as some staff corps are confined to duties requiring special instruction and long experience, their separate organization might be retained.

A general provision dispensing with the staff bureaus and giving the President authority to regulate the duties on the principles above stated, and to transfer, when necessary, officers to and from the line and staff, would restore the institution to its proper effectiveness. Thus, the staff near the War Department, representing the authority of the constitutional commander-in-chief of the army and navy, would bear the same relation to him as the staff attached to a corps in the field have to the colonel or general who commands it.

To avoid, for the future, the difficulties attending brevet rank, the best plan is to create, permanently, the general offices now exercised under brevets, making as many major generals and brigadier generals as the strength of the army requires. This would afford promotion to many brevet officers of inferior rank, and thus absorb nearly all; as the strength of the army requires these officers, and they have always existed under the brevet rank, no increase of expense would

follow their being permanently established. The law should then provide that brevet rank should give no right, under any circumstances, unless by the special assignment of the President in such case, retaining that rank as a mere honorary distinction, except in case of special assignment, but at all times recommending the bearer as a worthy candidate for promotion.

Promotion may be made a reward of merit and an incentive to zeal by enacting that it shall take place by seniority in corps (unless in extraordinary cases) to the rank of captain, and beyond that by selection from the next grade in the same arm to that to be filled as far as colonel, inclusive. General officers to be at the choice of the President, as they now are.

Much has been said as to the propriety of separating the purchase of stores and supplies, and all moneyed accountability, from the officers proper of the army.

This system has been adopted in France, but is objected to as giving to the civil officers thus employed an immunity from military control, injurious, if not fatal, to the interests of the service. This objection would be fully met by providing that this class of officers, without receiving military rank, or being entitled to command, should be amenable to military tribunals, and thus act under the same responsibility that the disbursing officer now does.

It is certain that an officer looking forward to military advancement and fame is tempted to incur risks on the field of battle, the fatal issue of which might ruin his family, and some of his friends, and his own reputation, through the disorder which his sudden death might bring into his pecuniary affairs.

These proposed changes would restore our military system to that simplicity which would render such amendments as experience might recommend easy and well adapted to existing circumstances.

I concur with my predecessor in other proposed ameliorations, and especially in preparing for infirm and disabled officers a competent and tranquil retreat, and for the unworthy a substantial dismissal from the service; thus securing that efficiency of the army which will entitle it to full respect from the country, and which the country have a right to demand.

This should be applied in two ways: First, on the application of the officer; and second, on the direction of the President, as if on accusation. A board of five officers of high rank to be detailed for each case, and the examination to be conducted as though on charges before a court martial; the President to decide on the report of the court. The disposal of the officers to be one of three kinds: First, an honorable release from duty, and from any corps to which he may be attached; remaining as a supernumerary officer with the pay and emoluments of his grade, as on leave of absence. Second, to be retired from the army, without censure or disgrace, on his pay proper, unless he forfeits it by misconduct. Third, to be retired from the army, without pay or compensation, except a gratuity of one year's, or six or three months' pay, to secure him from the evil consequences of absolute want.

## REPORT OF THE GENERAL-IN-CHIEF.

I call special attention to the report of the general-in-chief, and ask for his recommendations a favorable consideration. It is certainly true, that to call ours a peace establishment is a mere abuse of terms. It is well known that the casualties of the battle field bear a very small proportion to the loss of life from exposure and hardship encountered in long and perilous marches, and from protracted campaigns. In every particular, with the exception only of the battle field, no hardships encountered by any army prosecuting any war are greater than those to which a very large proportion of our troops are constantly exposed. And the dangers of battle are far from being insignificant, as the reports of these constantly recurring conflicts will abundantly show.

The plan of regimental depots for recruiting, I am confident, will be very advantageous to the service. It will produce a spirit of generous rivalry, conducive in the highest degree to good discipline and military bearing. The tone of the rank and file needs elevation extremely, and every means should be resorted to tending to effect it. If our troops were massed sufficiently to insure perfect drill and discipline; if they were made soldiers instead of day-laborers; if a feeling of pride instead of degradation resulted from their connexion with the service, the morale of the army would soon take that elevation which is most desirable in all armies, and which certainly ought to be pre-eminent in that of a great republic. The habit of employing soldiers as laborers is extremely detrimental to the service. They feel degraded because they are deprived of both the emoluments and the sturdy independence of the laboring man who feels that his vocation is honorable because it is independent and free. The soldier who enters the service with some degree of military aspiration, can but resent as a wrong the order which changes him from his legitimate vocation to that of a mere operative deprived of his fair wages. I think it would conduce greatly to the elevation of the rank and file if promotion to commission was made readily and certainly attainable by the really meritorious men in the ranks. If our army was put upon the proper footing, the anomalous spectacle of having two-thirds of our rank and file composed of foreigners would certainly not be witnessed.

## INDIAN HOSTILITIES.

The expenses of the army have been and are constantly much augmented by the necessity of moving large bodies of troops, at the shortest possible notice, from remote points, to overawe or suppress Indian outbreaks. The temper and spirit of the Indians are entirely unknown to the War Department, except through communications from the Department of the Interior, which, of course, would never be made, except when forces are deemed necessary for the public safety. The system of defence proposed through the double line of posts, herein recommended, would, I think, in a very great measure, neutralize this evil.

## RAILROAD TO THE PACIFIC.

The surveys heretofore ordered by Congress to ascertain the best route for the construction of a railroad from the western boundary of our States lying west of the Mississippi to the Pacific, have been carefully made, and the results elaborately set forth in eight large volumes. In the opinion of competent judges, there is now no controversy as to the most eligible route for the railroad, assuming that all the material facts in the case have been fully ascertained. The route from El Paso to the Colorado, besides being the shortest of all yet surveyed, possesses very decided advantages over others in several important particulars. The grades are lower, the climate milder, and the distance across the desert region, common to all the routes, is less upon this. Water, too, is sufficiently abundant upon the tract of this survey; so that in selecting a railroad route between the Pacific and the valley of the Mississippi, as far as our present information goes, that by El Paso would be chosen; but the consummation of this project, freed from all other difficulties, would require immense sums of money and a great length of time. Meanwhile other military roads very urgently require special and prompt opening and occupation. If the railroad were, to-day, completed from El Paso to the line of California, a strong and urgent necessity would still remain for maintaining and keeping open at least two of the other routes, for the passage of emigrants and the transportation of military stores to vast regions of our country accessible only by these routes. Then, as these routes are to be opened in any event, true policy and economy would seem to indicate that it should be done at once.

A line of stockade posts upon two of these routes would not require a very large force to maintain them, and, if placed at proper distances apart, would furnish certain means of a safe and rapid transportation of the mails and perfect protection to a telegraphic line from one ocean to the other, which latter object would, in itself, be worth far more to the country than the cost of the posts, and the expense of maintaining them.

## EXPLORATIONS AND SURVEYS.

There is no appropriation of equal amount, in charge of this department, that is productive of more real and substantial benefit to the public service than that for military explorations and surveys. At this time we are actually ignorant of the geography and general character of large tracts of country lying between the valley of the Mississippi and the Pacific ocean. Every day is adding new and important facts to our present stores of knowledge upon this subject. And, much as has been accomplished within the last few years, it is hazarding but little to say that we have only begun to acquire what it is so useful for us to understand thoroughly.

Two expeditions have been fitted out expressly to explore tracts of country hitherto wholly unknown. The first was sent to the northwest, beyond the waters of the Upper Missouri, towards the "Black

Hills," and will, no doubt, bring valuable information. The other is engaged in exploring the Colorado of the West, of which, to this time, nothing scarcely has been accurately known. I am not without strong hope that this exploration will result in discovering the best means by which the transportation of army stores can be effected to the interior of New Mexico and Utah.

But for the assistance rendered these explorations by the troops detailed for the purpose, the appropriations would prove wholly inadequate for any material results.

I transmit herewith the report of the Bureau of Explorations and Surveys, for more detailed information of the expeditions fitted out for these purposes, and of the progress made in the experiment of artesian wells.

#### MILITARY ROADS.

The military roads heretofore in charge of this department are progressing satisfactorily, under the superintendence of the officers having them in charge.

Amongst them is one from Fort Defiance to the mouth of the Mojave river, which deserves special notice from the plan adopted for its construction. The appropriation for this work was only fifty thousand dollars, whilst the length of the road was about 550 miles. I directed Edward F. Beale, esq., to whom I entrusted the construction of this road, to pass over and survey the route throughout the entire length, to lay out the road and make it passable for wagons at all difficult places.

With this party I sent thirty-five camels of those recently imported under the direction of my predecessor. This was intended as an experiment to test the efficiency of those animals as beasts of burden and transportation through the barren and difficult country of the great mountain range separating the Mississippi valley from the Pacific ocean. From the recent reports received from Mr. Beale, it would appear that the camels are likely to answer fully the high expectations entertained of them for military purposes by the honorable Secretary who introduced them into the country.

#### ARTESIAN WELLS.

Nothing worthy of special note has occurred since the last report upon the subject of artesian wells. I think there is not much doubt of the feasibility of procuring abundant supplies of good water by this means, and the benefits resulting from a successful prosecution of this enterprise are too palpable to require any illustration. For military purposes, these wells are altogether indispensable. The desert country, impassable now for want of water by any considerable military force, will, upon completion of the system of wells, be easily traversed from Fort Fillmore to Albuquerque, and from Fort Union to Santa Fé. The work is still under the direction of Captain Pope, who has hitherto had it in charge.

## MILITARY RESERVES.

Several military reservations, heretofore established for the occupation of troops upon the Indian frontier, having become useless for any military purposes, and calculated to retard the settlement of the country, have been sold under a law passed at the last session of Congress. With the exception of the reserve at Fort Ripley, the prices offered for these lands were satisfactory. The bids for the lands of the latter reservation being considered too low, the sale was set aside and the property retained.

## MILITARY ASYLUMS.

Under a law of the last Congress directing the sale of the western military asylum at Harrodsburg, Kentucky, an effort was made to consummate it, but without effect. After due and extensive advertisement of the day of sale, and upon the assembling of bidders, the property was offered at public outcry, but the highest sum offered was considered by the agent for the sale so inadequate that the property was withdrawn.

The asylum in this District is, to a limited extent, answering the purposes for which it was established. It furnishes a quiet and abundant home for the invalid soldiers who are admitted to it.

## NATIONAL FOUNDRY.

The importance to the public service of establishing a national foundry has been so often brought to the attention of Congress by my predecessors, that nothing but a conviction of its great consequence to the public and private interests of the whole country encourages me to mention it again.

A well-managed national foundry would very speedily develop and establish facts which would add immensely to our national wealth. It is scarcely to be credited that, with the infinite variety of iron ores and their boundless extent in the United States, we should not have yet discovered a mine capable of making the very best gun, or, if such be discovered, that there are no means by which the public service can be benefitted by it; but such is the fact.

A national foundry would serve as a great laboratory at which the qualities and value of metals throughout the whole confederacy would be tested and fixed. Every variety of iron, with its especial adaptation to particular uses, would, in a few years, be familiarly known to the country, and individual enterprise would be saved in experiments many times the amount which the works would cost, whilst a great national branch of industry might, by this means, receive a legitimate and efficient encouragement.

There is but little doubt that many American iron ores are equal at least to those of Norway, and yet the national armories are driven by necessity to purchase from abroad the Norwegian iron for the manufacture of small arms. Choosing to have the best quality of

arms, we must go abroad for the best quality of iron. A national foundry would soon teach to improve the manufacture of iron, and we would be saved the mortification of bringing iron from abroad, and the money, too, we have to pay for it.

The cost of heavy guns would presently be diminished, and their quality would be, undoubtedly, very materially improved.

It therefore appears to me that every consideration of sound policy and economy demands the establishment of a national foundry, which I accordingly respectfully recommend.

#### ORDNANCE.

The report of the chief of ordnance will explain in detail the condition of that most important branch of the public service. Its general operations have, in the main, been satisfactory. The manufacture of small arms at the two national armories continues with very much the same results as heretofore. The arms fabricated are of the most superior quality, although it is more than questionable whether the rifled or grooved musket is any improvement whatever upon the musket of the pattern adopted in 1842 for the use of infantry in the field.

The valuable property at Baton Rouge belonging to the government is being greatly injured by reason of the decayed condition of the wooden enclosure, which was constructed many years since. It is, therefore, advisable that some provision be made for building a substantial iron fence, and thereby preserving the buildings and grounds, which are now subject to serious damage and constant depredation.

I would also advise that, for the purpose of still further improving the grounds, authority be given to purchase a jut of land near the principal building, and to sell a piece of land at the extreme end of the property, of little value for government purposes. For these objects a small appropriation will be required.

As a school of practice for the artillery is established at Fort Monroe, which is much needed by the service, it is very desirable that one or two small tracts of land in the immediate vicinity of the post, and directly affected by the target firing, should belong to the government; therefore authority ought to be given to purchase this land, and thus remove all obstructions to the satisfactory establishment of the school at this important post.

#### THE NATIONAL DEFENCES.

The report of the chief engineer will inform you of the character and condition of our seacoast defences. It will be seen that these works are gradually, but certainly, advancing towards completion, and when finished will constitute a system of maritime defences formidable in extent, and of great magnitude.

New York, the great heart of commerce on this continent, where more and greater interests concentrate than at any point on our Atlantic coast, may be considered as impregnable from any attack from the sea when the fortifications now in progress shall be finished. The fortifi-

cations will be better, the guns heavier and more numerous than those of Sebastopol.

Upon the general system of seacoast defence it is hardly necessary to say a word at this day. The policy of the government seems to be fixed in that respect, and wisely, too, no doubt, if the works be prosecuted with a wise economy. Fortifications are now very justly esteemed the cheapest and far the most effectual means of defence for every important commercial point; with the heavy guns of the present day, no fleet can match a fortification; and when completed, these works can be kept in perfect repair at a very trifling cost until needed for actual service. A fortification costing not much more than double the sum necessary to build and equip a first class line of battle ship, will constitute a formidable defence for a harbor, and will continue to do so throughout any length of time. The value of this mode of defence is becoming more apparent every day. As our population increases, and the facilities for intercommunication are multiplied, a military force of any extent can with more and more readiness be concentrated at any given point in the shortest possible time. Fortifications, which will naturally retard the landing of a foreign foe, must give time to concentrate a force at any given point equal to any emergency. A larger force could be thrown into New York in two weeks, by means of internal communication, than could be brought there from abroad in a year by all the means which any European power could possibly command.

Our ramified system of railroads spreading throughout the whole country—those sinews of iron which bind with indissoluble ties the commercial interests of our community—confer upon the nation a capability for defence which obviates forever the necessity of standing armies, or of a navy more numerous than is necessary to give protection to our ships in the prosecution of our extended commerce.

#### PENSIONS.

The attention of Congress has been frequently called to the glaring discrepancy between the enactments regulating the pensions of soldiers and those of sailors. There is an invidious distinction between these two arms of service which rests upon no principle of reason or justice. It would, beyond doubt, conduce to the interest of the army, and the public service, too, if pensions in the army were put upon the same footing precisely with those of the navy. The recommendation of the general-in-chief I commend to your favorable notice and to that of Congress.

#### MILITARY BANDS.

The importance of regimental bands to the service admits of no doubt in the estimation of military men. In European armies great attention is paid to the subject, and great excellence exists in this department. Heretofore, in our service, the bands have been supported by contributions from the men in the shape of savings from the ration. Under the new regulations of the army, this fund, which



is certainly the property of the soldier, has been returned to him in the shape of more palatable addition to his subsistence, particularly when complaining from indisposition. The bands will be broken up, unless some means are set apart for their maintenance. This can readily be done by appropriating a sufficient sum for the purpose out of the fines and forfeitures of the army. This fund could not be devoted to a more desirable object.

#### OREGON AND WASHINGTON CLAIMS.

By a law passed the eighteenth day of August, 1856, a commission was directed to be appointed for the purpose of ascertaining the sum of money fairly due to the volunteers of Oregon and Washington Territories for their services in the Indian wars which threatened to lay waste those Territories. In compliance with this law, Captain Smith, of the 1st dragoons, Captain Rufus Ingalls, of the quartermaster's department, and Lafayette Grover, esq., of Salem, Oregon, were appointed to examine the accounts and claims, and to make a report in conformity with the law and upon the facts as they existed, so far, at least, as it was possible to ascertain them.

These officers entered upon their duties on the 10th day of October, 1856, and seem to have labored with great assiduity and patience in discharge of them until the 20th day of October last, when they were brought to a close. I have examined this report very carefully, and conclude that, from the data they adopted for their guide, as to the prices of stores and subsistence, and time of service rendered by the men, it is not probable a more just or accurate result could be attained than these gentlemen have arrived at. The amount ascertained to be due is a very large one, and Congress will have to make provision for its payment, if it is intended they shall be liquidated, of which I presume there can now be no doubt.

#### BREECH-LOADING ARMS.

The appropriation for the purchase of the best breech-loading rifle has been nearly all expended for arms of different construction—some for experiment in the field, thought to be far the best test, and some have been purchased for use in the army, having been already approved by trials in the hands of troops in actual service.

I think there existed no arm of the sort at the time the appropriation was made which has not been materially improved since, and much of this improvement has taken place since the trial made of this sort of arm last summer, at West Point, under the direction of a board of officers appointed for the purpose. The variety of breech-loading arms is extremely great, and the ingenuity exhibited in constructing them highly creditable. Some of these arms are best for one sort of service, whilst others answer best for another, and the purchases made have been determined with a view to this object. Improvements are still going on in the construction of this particular arm, and, with some further encouragement, valuable results will no doubt be attained.

Some of these arms combine, in a very high degree, celerity and accuracy of fire, with great force, at long range.

## TOPOGRAPHICAL BUREAU.

The clear and complete reports from this bureau will fully apprise you of its labors during the past year, and its present condition.

## AQUEDUCT, CAPITOL, AND POST OFFICE EXTENSION.

These works are still under the direction of the officer heretofore in charge of them, and his report will show the progress made in their prosecution, as well as his estimates for money to carry on the work in the future.

## QUARTERMASTER GENERAL'S BUREAU.

The operations of this department for the past year will fully appear from the Quartermaster General's report, herewith transmitted.

The sums expended in this branch of the public service are extremely large, but the duties performed are very great, and the necessities for the payment of immense sums of money in this department seem unavoidable. This vast expenditure will cease to be a matter of surprise to any one who, with proper information, reflects fully upon the extent and character of the country over which our military operations are conducted.

We are not apt to carry along, as an element of reflection in drawing a contrast between the present and former expenditures, the enormous increase of distances to be traversed, and the difficulties which multiply themselves from transportation over a wild, barren, sterile, uninhabited waste.

Our territory lying between the Mississippi river and the Pacific ocean is about 1,200 miles in length from north to south; its breadth from east to west, in latitude  $49^{\circ}$ , is 1,500 miles; in latitude  $38^{\circ}$ , 1,800 miles; and in latitude  $32^{\circ}$ , 1,500 miles; the area being about 2,000,000 square miles.

The meridian of  $105^{\circ}$  west longitude divides this territory into two nearly equal parts. The eastern half is a great plain rising gradually from the Mississippi river to the foot of the mountains along the meridian of  $105^{\circ}$ , where its elevation, near the northern boundary, is 2,500 feet; in the middle latitude, 6,000 feet; and near the southern boundary, 4,000 feet above the sea. The western half is a mountain region, the chains of which, so far as yet known, have, generally, a direction north and south.

If we draw a line nearly coinciding with the meridian of  $99^{\circ}$  west longitude, dividing the great plain into two nearly equal parts, we shall find that portion east of this line differing entirely from that west of it. The eastern part is fertile, the western arid and sterile. The width of the fertile district is from 400 to 500 miles, of the sterile from 300 to 400 miles. The surface of this uncultivable region along the routes generally travelled, is sandy, gravelly, and pebbly.

It supports no trees, except a few willows and cotton-woods along the streams, to which mezquite is added in the southern latitudes. The grass is sparse; numerous varieties of cactus are abundant. Portions of the river bottoms (where the soils of the different strata become mixed, and where water can be had for irrigation) are, to a limited extent, cultivable. The minor streams frequently disappear in the sands.

On the western border of the plain the mountains rise abruptly from it. The routes explored by the Pacific railroad parties entered the mountain region through the lowest known passes, whose altitudes vary from 4,000 to 10,000 feet above the sea. The mountain ridges and peaks rise above these passes from 1,000 to 6,000 feet. Nearly the entire distance to the Pacific is occupied by mountains separated by desert plains or basins. The two great chains forming the east and west border of the mountain region have the greatest elevation, inclosing, as it were, the others.

Great aridity and sterility characterize the mountain region, except the Pacific slopes of its western border, and generally the aspect is dreary and desolate in the extreme.

To be sure, at the foot of the western slopes of the highest mountain chains and spurs, fertile soil, and the means of irrigation are often found. And there are small mountain valleys that are cultivable, and also river bottoms; but the plains may be called barren, and, with rare exceptions, the soil can only be cultivated when the means of irrigation are at hand. Occasionally belts of forest are found among the mountains, but the instances are exceptional.

The great uncultivable belt, including plain and mountain region, through which all routes to the Pacific must pass, has a width near our northern boundary of 1,100 miles; in latitude 38°, of 1,200 miles, and near the southern boundary, of 1,000 miles. The length of the roads through the belt is of course greater.

Over nearly this whole region, and over distances quite as great as these, the quartermaster's department is called upon to furnish transportation and supplies for our troops, who are keeping up a continual patrol of that vast territory, and a great portion of the time engaged in warfare with the numerous and hardy savages who range perpetually over those boundless wilds. Heavy expenditures cannot be avoided in the quartermaster's department as long as we keep up a military organization in the west.

I have the honor to be, very respectfully, your obedient servant,  
JOHN B. FLOYD,  
*Secretary of War.*

TO THE PRESIDENT OF THE UNITED STATES.

*Documents accompanying the report of the Secretary of War.*

- No. 1. Reports on Utah expedition.
  - No. 2. Report from Bureau of Explorations and Surveys.
  - No. 3. Report on the Capitol extension, reconstruction of dome, and Post Office extension.
  - No. 4. Report from Commanding General.
  - No. 5. Report of the Adjutant General.
  - No. 6. Report of the Quartermaster General.
  - No. 7. Report of the Commissary General.
  - No. 8. Report of the Paymaster General.
  - No. 9. Report of the Surgeon General.
  - No. 10. Report of the Chief Engineer.
  - No. 11. Report of the Chief Topographical Engineer.
  - No. 12. Report of the Chief of Ordnance.
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## No. 1.

## REPORTS ON UTAH EXPEDITION.

HEADQUARTERS OF THE ARMY,  
*New York, June 29, 1857.*

SIR: The letter which I addressed to you in the name of the General-in-chief, on the 28th ultimo, his circular to the chiefs of staff department, same date, his general orders, No. 8, current series, and another, now in press, have indicated your assignment to the command of an expedition to Utah Territory, and the preparatory measures to be taken.

The General-in-chief desires me to add, in his name, the following instructions, prepared in concert with the War Department, and sanctioned by its authority wherever required.

The community and, in part, the civil government of Utah Territory are in a state of substantial rebellion against the laws and authority of the United States. A new civil governor is about to be designated, and to be charged with the establishment and maintenance of law and order. Your able and energetic aid, with that of the troops to be placed under your command, is relied upon to insure the success of his mission.

The principles by which you should be guided have been already indicated in a somewhat similar case, and are here substantially repeated.

If the governor of the Territory, finding the ordinary course of judicial proceedings, and the power vested in the United States marshals and other proper officers, inadequate for the preservation of the public peace and the due execution of the laws, should make requisition upon you for a military force to aid him as a *posse comitatus* in the performance of that official duty, you are hereby directed to employ for that purpose the whole or such part of your command as may be required; or, should the governor, the judges, or marshals of the Territory find

it necessary directly to summon a part of your troops to aid either in the performance of his duties, you will take care that the summons be promptly obeyed; and in no case will you, your officers or men, attack any body of citizens whatever, except on such requisition or summons, or in sheer self-defence.

In executing this delicate function of the military power of the United States, the civil responsibility will be upon the governor, the judges, and marshals of the Territory. While you are not to be, and cannot be, subjected to the orders, strictly speaking, of the governor, you will be responsible for a zealous, harmonious, and thorough co-operation with him, on frequent and full consultation, and will conform your action to his request and views in all cases where your military judgment and prudence do not forbid, nor compel you to modify, in execution, the movements he may suggest. No doubt is entertained that your conduct will fully meet the moral and professional responsibilities of your trust, and justify the high confidence already reposed in you by the government.

The lateness of the season, the dispersed condition of the troops, and the smallness of the numbers available, have seemed to present elements of difficulty, if not hazard, in this expedition. But it is believed that these may be compensated by unusual care in its outfit and great prudence in its conduct. All disposable recruits have been reserved for it.

So well is the nature of this service appreciated, and so deeply are the honor and interests of the United States involved in its success, that I am authorized to say the government will hesitate at no expense requisite to *complete* the efficiency of your little army, and to insure health and comfort to it, as far as attainable. Hence, in addition to the liberal orders for its supply heretofore given—and it is known that ample measures, with every confidence of success, have been dictated by the chiefs of staff departments here—a large discretion will be made over to you in the general orders for the movement. The employment of spies, guides, interpreters, or laborers may be made to any reasonable extent you may think desirable.

The prudence expected of you requires that you should anticipate resistance, general, organized, and formidable, at the threshold, and shape your movements as if it were certain, keeping the troops well massed and in hand when approaching expected resistance. Your army will be equipped, for a time at least, as a self-sustaining machine. Detachments will, therefore, not be lightly hazarded; and you are warned not to be betrayed into premature security or over-confidence.

A small but sufficient force must, however, move separately from the main column, guarding the beef cattle and such other supplies as you may think would too much encumber the march of the main body. The cattle may require to be marched more slowly than the troops, so as to arrive in Salt Lake valley in good condition, or they may not survive the inclemency and scanty sustenance of the winter. This detachment, though afterwards to become the rear guard, may, it is hoped, be put in route before the main body, to gain as much time as possible before the latter passes it.

The General-in-chief suggests that feeble animals, of draught and

cavalry, should be left ten or twelve days behind the main column, at Fort Laramie, to recruit and follow.

It should be a primary object in arriving in the valley, if the condition of things permit, to procure not only fuel, but materials for hutting the troops; should it be too late for the latter purpose, or should such employment of the troops be unsafe or impracticable, the tents (of Sibley's pattern) furnished will, it is hoped, afford a sufficient shelter. It is not doubted that a surplus of provisions and forage, beyond the wants of the resident population, will be found in the valley of Utah, and that the inhabitants, if assured by energy and justice, will be ready to sell them to the troops. Hence no instructions are given you for the extreme event of the troops being in absolute need of such supplies and their being withheld by the inhabitants. The necessities of such an occasion would furnish the law for your guidance.

Besides the stated reports required by regulations, special reports will be expected from you at the headquarters of the army as opportunity may offer.

The General-in-chief desires to express his best wishes, official and personal, for your complete success, and added reputation.

I have the honor to be, sir, very respectfully, your obedient servant,

GEORGE W. LAY,

*Lieutenant Colonel, Aid-de-Camp.*

Brevet Brigadier General W. S. HARNEY,

*Commanding, &c., &c., Fort Leavenworth, K. T.*

P. S.—The General-in-chief (in my letter of the 26th instant) has already conveyed to you as a suggestion—not an order, nor even a recommendation—that it might be well to send forward, in advance, a part of your horse to Fort Laramie, there to halt and be recruited in strength, by rest and by grain, before the main body comes up.

Respectfully,

G. W. L.,  
*Lt. Col., A. D. C.*

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WASHINGTON, August 28, 1857.

COL: In anticipation of the orders to be issued placing you in command of the Utah expedition, the General-in-chief directs you to repair without delay to Fort Leavenworth, and apply to Brevet Brigadier General Harney for all the orders and instructions he has received, as commander of that expedition, which you will consider addressed to yourself, and by which you will be governed accordingly.

You will make your arrangements to set out from Fort Leavenworth at as early a day as practicable.

Six companies of the 2d dragoons will be detached by General Harney to escort you and the civil authorities to Utah—to remain as part of your command, instead of the companies of the 1st cavalry, as

heretofore ordered. Brevet Major F. J. Porter, assistant adjutant general, will be ordered to report to you for duty before you leave Fort Leavenworth.

I have the honor to be, colonel, very respectfully, your most obedient servant,

IRWIN McDOWELL,  
*Assistant Adjutant General.*

Col. ALBERT S. JOHNSTON,  
*2d Cavalry, Washington, D. C.*

HEADQUARTERS ARMY OF UTAH,  
*North Bank of South Fork of Platte, September 29, 1857.*

MAJOR: We have just crossed the south fork of the Platte, and met here the express with Captain Van Vliet's report of the result of his journey to Salt Lake City, which I forward for the information of the General-in-chief.

When I reach the troops in advance, I will proceed at once to execute the orders I have received, and not delay the march unless prevented by the destruction of the grass on the route by cold, or the filling up of the passes by snow. In either event, a suitable position will be taken until it is practicable to advance.

We are making our journey with more despatch than I expected. We will be at Laramie on the 2d of October. The 5th and 10th infantry, with the batteries, marched from Fort Laramie, as was expected, with the exception of Reno's battery, which left on the 8th, a day later.

The weather continues mild, and there is an abundance of grass on the route. I think there can be no doubt of Colonel Cook's arrival at Fort Laramie by the 18th of October. I will travel with all rapidity practicable till I reach the troops in advance, and will report everything material by every opportunity.

With great respect, your obedient servant,

A. S. JOHNSTON,  
*Colonel 2d Cavalry, Commanding Army of Utah.*  
Major IRWIN McDOWELL,  
*Assistant Adjutant General,*  
*Headquarters of the Army, New York City.*

HEADQUARTERS ARMY OF UTAH, ASH HOLLOW,  
*En route to Salt Lake City, September 29, 1857.*

Duplicate: Original forwarded by express from north bank of south fork of Platte.

HAM'S FORK, *September 16, 1857.*

CAPTAIN: I have the honor to report, for the information of the commanding general, the result of my trip to the Territory of Utah.

In obedience to special instructions, dated headquarters army for Utah, Fort Leavenworth, July 28, 1857, I left Fort Leavenworth July 30th, and reached Fort Kearney in nine travelling days, Fort Laramie in ten, and Great Salt Lake City in thirty-three and a half. At Fort Kearney I was detained one day by the changes I had to make, and by sickness, and at Fort Laramie three days, as all the animals were forty miles from the post, and when brought in all had to be shod before they could take the road.

I travelled as rapidly as it is possible to do with six mule wagons; several of my teams broke down, and at least half of my animals are unserviceable, and will remain so until they recruit. During my progress towards Utah I met many people from that Territory, and also several mountain men, at Green river, and all informed me that I would not be allowed to enter Utah, and if I did I would run great risk of losing my life; I treated all this, however, as idle talk, but it induced me to leave my wagons and escort at Ham's fork, 143 miles this side of the city, and proceed alone.

I reached Great Salt Lake City without molestation, and immediately upon my arrival I informed Governor Brigham Young that I desired an interview, which he appointed for the next day. On the evening of the day of my arrival, Governor Young with many of the leading men of the city, called upon me at my quarters. The governor received me most cordially, and treated me during my stay, which continued some six days, with the greatest hospitality and kindness. In this interview the governor made known to me his views with regard to the approach of the United States troops, in plain and unmistakable language.

He stated that the Mormons had been persecuted, murdered, and robbed, in Missouri and Illinois, both by the mob and State authorities, and that now the United States were about to pursue the same course; and that, therefore, he and the people of Utah had determined to resist all persecution at the commencement, and that the *troops now on the march for Utah should not enter the Great Salt Lake valley*; as he uttered these words, all there present concurred most heartily in what he said.

The next day, as agreed upon, I called upon the governor, and delivered in person the letters with which I had been entrusted.

In that interview, and in several subsequent ones, the same determination to resist to the death the entrance of the troops into the valley was expressed by Governor Young and those about him. The governor informed me that there was abundance of everything I required for the troops, such as lumber, forage, &c., but that none would be sold to us.

In the course of my conversations with the governor and the influential men in the Territory, I told them plainly and frankly what I conceived would be the result of their present course; I told them that they might prevent the small military force now approaching Utah from getting through the narrow defiles and rugged passes of the mountains this year, but that next season the United States government would send troops sufficient to overcome all opposition. The answer to this was invariably the same. "We are aware that



such will be the case; but when those troops arrive they will find Utah a desert; every house will be burned to the ground, every tree cut down, and every field laid waste. We have three years' provisions on hand, which we will 'cache,' and then take to the mountains, and bid defiance to all the powers of the government." I attended their service on Sunday, and, in course of a sermon, delivered by Elder Taylor, he referred to the approach of the troops, and declared they should not enter the Territory. He then referred to the probability of an overpowering force being sent against them, and desired all present who would apply the torch to their own buildings, cut down their trees, and lay waste their fields, to hold up their hands; every hand in an audience numbering over 4,000 persons was raised at the same moment. During my stay in the city I visited several families, and all with whom I was thrown looked upon the present movement of the troops towards their Territory as the commencement of another religious persecution, and expressed a fixed determination to sustain Governor Young in any measures he might adopt.

From all these facts, I am forced to the conclusion that Governor Young and the people of Utah will prevent, if possible, the army for Utah from entering their Territory this season. This, in my opinion, will not be a difficult task, owing to the lateness of the season, the smallness of our force, and the defences that nature has thrown around the valley of the Great Salt Lake.

There is but one road running into the valley on the side which our troops are approaching, and for over fifty miles it passes through narrow cañons and over rugged mountains, which a small force could hold against great odds. I am inclined, however, to believe that the Mormons will not resort to actual hostilities until the last moment. Their plan of operations will be, burn the grass, cut up the roads, and stampede the animals, so as to delay the troops until snow commences to fall, which will render the road impassable. Snow falls early in this region; in fact, last night it commenced falling at Fort Bridger, and this morning the surrounding mountains are clothed in white. Were it one month earlier in the season, I believe the troops could force their way in, and they may be able to do so even now; but the attempt will be fraught with considerable danger, arising from the filling up of the cañons and passes with snow.

I do not wish it to be considered that I am advocating either the one course or the other; I simply wish to lay the facts before the general, leaving it to his better judgment to decide upon the proper movements.

Notwithstanding my inability to make the purchases I was ordered to, and all that Governor Young said in regard to opposing the entrance of the troops into the valley, I examined the country in the vicinity of the city with the view of selecting a proper military site. I visited the military reserve, Rush valley, but found it, in my opinion, entirely unsuited for a military station. It contains but little grass, and is very much exposed to the cold winds of winter, its only advantage being the close proximity of fine wood; it is too far from the city, being between forty and forty-five miles, and will require teams four days to go there and return. I examined another point on the road

to Rush valley, and only about thirty miles from the city, which I consider a much more eligible position; it is in Tuella valley, three miles to the north of Tuella city, and possesses wood, water, and grass, but it is occupied by Mormons, who have some sixty acres under cultivation, with houses and barns on their land. These persons would have to be dispossessed or bought out. In fact, there is no place within forty, fifty, or sixty miles of the city, suitable for a military position, that is not occupied by the inhabitants and under cultivation. Finding that I could neither make the purchases ordered to, nor shake the determination of the people to resist the authority of the United States, I left the city and returned to my camp on Ham's fork. On my return I examined the vicinity of Fort Bridger, and found it a very suitable position for wintering the troops and grazing the animals, should it be necessary to stop at that point. The Mormons occupy the fort at present, and also have a settlement about ten miles further up Black's fork, called Fort Supply. These two places contain buildings sufficient to cover nearly half the troops now en route for Utah, but I was informed that they would all be laid in ashes as the army advanced.

I have thus stated fully the result of my visit to Utah, and, trusting that my conduct will meet the approval of the commanding general, I am, very respectfully, your obedient servant,

STEWART VAN VLIET,  
*Captain, Assistant Quartermaster.*

Captain PLEASANTON,  
*Acting Assistant Adjutant General, Army for Utah,  
Fort Leavenworth.*

P. S. I shall start on my return to-morrow with an escort of ten men.

HEADQUARTERS ARMY OF UTAH,  
*Ash Hollow, en route to Salt Lake City,  
September 29, 1857.*

Copy: Original forwarded by express from north bank of south fork of Platte.

Official.

STEWART VAN VLIET,  
*Captain, Assistant Quartermaster.*

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HEADQUARTERS ARMY FOR UTAH,  
*Fort Leavenworth, July 28, 1857.*

CAPTAIN: By special orders No. 13, from these headquarters, of this date, you are directed to proceed with the utmost despatch to Salt Lake City, Territory of Utah, for the purpose of making the necessary arrangements and purchases for providing the troops of the army for Utah with sufficient forage, fuel, &c., on their arrival at or near that place.

The general commanding has deemed it proper and courteous to in-

form President Young, of the Society of Mormons, of the object of your visit, and has also requested of him the required facilities to enable you to execute your instructions certainly and effectively. You will, therefore, call upon President Young in person, in the first instance, and deliver to him the enclosed communication; at the same time you will explain freely and fully the object of your mission and the steps you propose to take for its accomplishment.

You will ascertain as soon as possible to what points on the road forage can be furnished the troops, and in what quantities; also, the amounts to be obtained near the Salt Lake City, together with such other information as you can gather which will be useful to the general commanding, all of which you will forward by special express to these headquarters, sending a copy of that portion relating to the supplies of forage on the road, and whatever else may be essential, to the senior officer with the troops *en route*, for his information and guidance.

You will obtain a suitable location for the troops in the vicinity of Salt Lake City, sufficiently near to be effective in supporting the civil authority in the maintenance of the territorial laws, but allowing ample room to prevent an improper association of the troops with the citizens—an object in this selection of primary importance.

A position called Scull valley, some sixty miles from the city, has been mentioned as favorable for this purpose; the distance, however, is too great. Any place some twenty or thirty miles from the city, possessing the necessary requisites of wood, water, and grazing, would be most advantageous. In this selection great care, judgment, and discretion will be observed.

You have authority to contract for such lumber and other articles which, in your opinion, will be necessary for hutting the troops, stabling the animals, &c., during the winter.

The quartermaster general will be requested to place at your disposal the funds required to meet your expenses.

You will impress upon the officer in charge of your escort the imperative necessity for a very careful circumspection of conduct in his command. The men should not only be carefully selected for this service, but they should be repeatedly admonished never to comment upon or ridicule anything they may either see or hear, and to treat the inhabitants of Utah with kindness and consideration.

After completing the duties thus assigned to you, you are instructed to report in person to the quartermaster general, in the event of the general commanding being absent from this post.

In conclusion, the general tenders you his best wishes for success in a mission requiring the high bearing, intelligence, and devotion which have confirmed your selection in this instance.

I am, captain, very respectfully, your obedient servant,

A. PLEASANTON,

*Captain 2d Dragoons, A. Asst. Adjt. General.*

Captain STEWART VAN VLIET,

*Assistant Quartermaster, Fort Leavenworth, Kansas Territory.*

HEADQUARTERS ARMY FOR UTAH,  
*Camp Winfield, U. T., October 9, 1857.*

SIR: I have the honor to report that I have assumed command of the troops of the United States, constituting a part of the army for Utah, which are now encamped at this point. These troops are: the 5th regiment of infantry, eight companies of the 10th infantry, and the batteries of artillery (6 and 12-pounders) commanded by Captains Phelps, 4th artillery, and Reno, ordnance department, respectively. This camp is situated on Ham's fork, a tributary of Black's fork, which is, in turn, a tributary of Green river, about fifteen miles above the junction of the two forks. Fort Bridger is distant, in a southeast direction, about thirty miles. The 10th infantry reached here on the 28th of September; Phelps' battery on the following day. The 5th infantry arrived on the 4th of October, and Reno's battery on the same day. On the 5th instant I assumed command, for reasons which I conceive to be of the greatest importance to the troops and their supplies, and of which I shall have the honor to make a full report when a safer and more certain opportunity of sending despatches presents itself. At present I can give only a statement of what has occurred since my arrival, and report the disposition I have determined to make of the troops. On the day after reaching Ham's fork, and at the first camp I made on it, I received the enclosed letters from Governor Young and Lieutenant General Wells. The propositions they contain, however absurd they are, showed conclusively that a determined opposition to the power of the government was intended. I had met Captain Van Vliet on the 21st of September returning from Salt Lake City, and was informed by him that although the Mormons, or rather Governor Young, were determined to oppose an entrance into the city, yet he was assured that no armed resistance would be attempted if he went no further than Fort Bridger and Fort Supply. I was still further convinced of this by the circumstance that a train of more than one hundred contractor's wagons had been parked for nearly three weeks on Ham's fork without defence, and had been unmolested, although they contained provisions and supplies which would have been of great use to the Mormons.

Upon receiving these letters, I prepared for defence, and to guard the supplies near us until the nearest troops came up. I replied to Governor Young's letter, a copy of which I enclose, and have not had any further correspondence with him. On the morning of the 5th of October the Mormons burned two trains of government stores on Green river, and one on the Big Sandy, and a few wagons belonging to Mr. Perry, sutler of the 10th infantry, which were a few miles behind the latter train. Colonel Waite, of the 5th, though not anticipating any act of the kind, was preparing to send back a detachment to these trains from his camp on Black's fork, when he received, from some teamsters who came in, the intelligence of their being burned. No doubt now existed that the most determined hostility might be expected on the part of the Mormons; and it became necessary, from the extreme lateness of the season, to adopt some immediate course for wintering the troops and preserving the supply trains

with us. After much deliberation, and assisted by the counsel of the senior officers, I determined to move the troops by the following route: Up Ham's fork, about eighteen miles, to a road called Sublette's Cut-off; along that road to Bear river and Soda Spring. On arriving at Soda Spring two routes will be open—one down Bear River valley, towards the Salt Lake, and one to the northeast, towards the Wind River mountains—where good valleys for wintering the troops and stock can be found.

The adoption of one of these will be decided by the following circumstances: If the force under my command is sufficient to overcome the resistance which I expect to meet at Soda Spring, I shall endeavor to force my way into the valley of Bear river and occupy some of the Mormon villages, because I am under the impression that the Mormons, after a defeat, would be willing, and bring provisions for sale. The supplies on hand will last six months; and if I can get possession of a town in Bear River valley, I can easily fortify and hold it all winter.

There are also several supply trains in rear, to which I have communicated, and if they receive my letter in time, they will be saved, and can join us. If the Mormons are too strong for us, which I do not anticipate, the other road will be adopted, and I will make the best of my way to the mountains and tent for the winter.

I desire to impress upon you the fact that I, though *not* the commander appointed for this army, have adopted this course because the safety of the troops absolutely depends upon an *immediate* effort, and having information which makes it certain that the commander will not reach here before the 20th instant, and if we wait until that time we cannot leave this valley. The information I allude to is to the effect that Colonel Johnston had relieved General Harney, and had not left Fort Leavenworth on the 10th of September, and thirty days is the least possible time in which he can arrive here.

I cannot, for fear of this being intercepted, tell you the strength of my command, or send returns of it. It is strong enough to defend itself and its supplies. Whether it is able to assume and sustain an offensive position remains to be seen; but should the commands which I have heard are in rear come up in time, I think we will have sufficient force to carry out an active invasion. If we are obliged to winter in the mountains, you can perceive by a reference to Stansbury's maps that we will have an open road to Salt Lake City in the spring, and one which, I am told, is open early. By this one attack can be made, and attention called from the main road, (that by Fort Bridger,) which may then be traversed by troops. The Bear river route is, however, said to be the best one into the valley. The other passes through cañons that can be defended by a handful against thousands; and it is, moreover, so easily obstructed, that in a week it could be made utterly impassable. The want of cavalry is severely felt; and we are powerless, on account of this deficiency, to effect any chastisement of the marauding bands that are constantly hovering about us.

On the 7th instant I detached Captain Marcy, 5th infantry, with four companies, to Green river, to collect what he could find service

able from the burned trains, and to disperse any bodies of Mormons he found.

In conclusion, permit me to express the hope that my acts will meet the approval of the government, and on the first opportunity I will make a fuller and more detailed report. It is unquestionably the duty of the government to quell, by overwhelming force, this treasonable rebellion of the governor and people of Utah, and I must most urgently impress upon the War Department the fact that the small body of troops here will need reinforcements and supplies as soon as they can possibly be got here next spring. I would further respectfully suggest that troops should be sent from California and Oregon. It is said that the road from California to Salt Lake is passable all winter, and it is certainly so much earlier in the spring than that from the States.

I am, sir, very respectfully, your obedient servant,

E. B. ALEXANDER,  
*Col. 10th Infantry, Commanding.*

Colonel S. COOPER,  
*Adjutant General U. S. Army.*

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[Endorsement on the foregoing.]

HEADQUARTERS ARMY OF UTAH,  
*28 miles from South Pass, October, 15, 1857.*

I have read this communication, and respectfully refer it to the consideration of the General-in-chief. I will remain near the Pacific Springs, with Colonel Smith, until the arrival of Lieutenant Smith, and will move on to the army, protecting the supply trains.

With great respect, your obedient servant,

A. S. JOHNSTON,  
*Col. 2d Cavalry, Commanding army, Utah.*

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FORT BRIDGER, *September 30, 1857.*

SIR: I have the honor to forward you the accompanying letter from his excellency Governor Young, together with two copies of his proclamation and a copy of the Laws of Utah, 185, chap. 7, containing the organic act of the Territory.

It may be proper to add, that I am here to aid in carrying out the instructions of Governor Young. General Robison will deliver these papers to you and receive such communication as you may wish to make.

Trusting that your answer and actions will be dictated by a proper respect for the rights and liberties of American citizens,

I remain, very respectfully,

DANIEL H. WELLS,  
*Lieut. General, Commanding Navvoo Legion.*

GOVERNOR'S OFFICE, UTAH TERRITORY,  
Great Salt Lake City, September 29, 1857.

SIR: By reference to the act of Congress, passed September 9, 1850, organizing the Territory of Utah, published in a copy of the Laws of Utah, herewith forwarded, p. 146, chap. 7, you will find the following:

"SEC. 2. *And be it further enacted*, That the executive power and authority in and over said Territory of Utah shall be vested in a governor, who shall hold his office for four years, *and until his successor shall be appointed and qualified*, unless sooner removed by the President of the United States. The governor shall reside within said Territory, shall be commander-in-chief of the militia thereof," &c., &c.

I am still the governor and superintendent of Indian affairs for this Territory, no successor having been appointed and qualified as provided by law, nor have I been removed by the President of the United States.

By virtue of the authority thus vested in me, I have issued and forwarded you a copy of my proclamation, forbidding the entrance of armed forces into this Territory. This you have disregarded. I now further direct that you retire forthwith from the Territory by the same route you entered. Should you deem this impracticable, and prefer to remain until spring in the vicinity of your present encampment, Black fork, or Green river, you can do so in peace and unmolested, on condition that you deposit your arms and ammunition with Lewis Robison, quartermaster general of the Territory, and leave in the spring as soon as the condition of the roads will permit you to march. And should you fall short of provisions, they can be furnished you upon making the proper applications therefor.

General D. H. Wells will forward this and receive any communication you may have to make.

Very respectfully,

BRIGHAM YOUNG,  
*Governor and Super't. of Indian Affairs, Utah Territory.*

To the OFFICER COMMANDING THE FORCES  
*Now invading Utah Territory.*

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*Proclamation by Governor Brigham Young.*

CITIZENS OF UTAH: We are invaded by a hostile force, who are evidently assailing us to accomplish our overthrow and destruction. For the last twenty-five years we have trusted officials of the government, from constables and justices to judges, governors, and presidents, only to be scorned, held in derision, insulted, and betrayed. Our houses have been plundered and then burned, our fields laid waste, our principal men butchered while under the pledged faith of the government for their safety, and our families driven from their homes to find that shelter in the barren wilderness, and that protection among hostile savages,

which were denied them in the boasted abodes of Christianity and civilization.

The Constitution of our common country guaranties unto us all that we do now or have ever claimed. If the constitutional rights which pertain unto us as American citizens were extended to Utah, according to the spirit and meaning thereof, and fairly and impartially administered, it is all that we could ask—all that we have ever asked.

Our opponents have availed themselves of prejudice existing against us, because of our religious faith, to send out a formidable host to accomplish our destruction. We have had no privilege nor opportunity of defending ourselves from the false, foul, and unjust aspersions against us, before the nation. The government has not condescended to cause an investigating committee, or other person, to be sent to inquire into and ascertain the truth, as is customary in such cases. We know those aspersions to be false, but that avails us nothing. We are condemned unheard, and forced to an issue with an armed mercenary mob which has been sent against us at the instigation of anonymous letter writers, ashamed to father the base, slanderous falsehoods which they have given to the public, of corrupt officials who have brought false accusations against us to screen themselves in their own infamy, and of hireling priests and howling editors who prostitute the truth for filthy lucre's sake.

The issue which has thus been forced upon us compels us to resort to the great first law of self-preservation, and stand in our own defence: a right guarantied to us by the genius of the institutions of our country, and upon which the government is based. Our duty to ourselves—to our families—requires us not to tamely submit to be driven and slain without an attempt to preserve ourselves. Our duty to our country—our holy religion—our God—to freedom and liberty—requires that we should not quietly stand still and see those fetters forging around us which are calculated to enslave and bring us in subjection to an unlawful military despotism, such as can only emanate, in a country of constitutional law, from usurpation, tyranny, and oppression.

Therefore, I, Brigham Young, governor and superintendent of Indian affairs for the Territory of Utah, in the name of the people of the United States in the Territory of Utah, forbid—

First. All armed forces of every description from coming into this Territory under any pretence whatever.

Second. That all the forces in said Territory hold themselves in readiness to march at a moment's notice to repel any and all such invasion.

Third. Martial law is hereby declared to exist in this Territory from and after the publication of this proclamation; and no person shall be allowed to pass or repass into, or through, or from, this Territory without a permit from the proper officer.

Given under my hand and seal at Great Salt Lake City, Territory of Utah, this fifteenth day of September, A. D. eighteen hundred and fifty-seven, and of the Independence of the United States of America the eighty-second.

BRIGHAM YOUNG.



HEADQUARTERS 10TH REGIMENT INFANTRY,  
*Camp Winfield, on Ham's Fork, October 2, 1857.*

SIR: I have the honor to acknowledge the receipt of your communication of September 29, 1857, with two copies of proclamation and one of "Laws of Utah," and have given it an attentive consideration.

I am at present the senior and commanding officer of the troops of the United States at this point, and I will submit your letter to the general commanding as soon as he arrives here.

In the meantime I have only to say, that these troops are here by the orders of the President of the United States, and their future movements and operations will depend entirely upon orders issued by competent military authority.

I am, sir, very respectfully, &c.,

E. B. ALEXANDER,  
*Col. 10th U. S. Infantry, Commanding.*

BRIGHAM YOUNG, Esq.,  
*Governor of Utah Territory.*

HEADQUARTERS 10TH INFANTRY, *October 2, 1857.*

Official.

HENRY E. MAYNADIER,  
*Adjutant 10th Infantry.*

HEADQUARTERS ARMY OF UTAH,  
*Camp on the Three Crossings of Sweetwater, Oct. 13, 1857.*

MAJOR: To-night two men who live at Fort Laramie, and who had been sent on express to Colonel Alexander, arrived at our camp on their way back. From them I learn that the Mormons, having interposed a force in rear of our troops, then encamped at Ham's Fork of Green river, succeeded in burning three supply trains, with their contents. A message from Colonel Alexander was sent by them to Colonel C. F. Smith, instructing him to protect the trains in the rear, which contained the clothing, Sibley tents, subsistence, &c.

The orders with regard to the march of the cavalry and companies of the 6th having been countermanded, leaves Colonel Smith with only twenty-two men. Forty-seven men of his command were left at Laramie as part of the governor's escort.

Lieutenant Smith, of the dragoons, is four days' march behind us, with two companies of dragoons; the forty-seven men of Colonel Smith's command and twenty-five dragoons of my escort, who were left at Laramie to come on with Lieutenant Smith; his command will number about two hundred men. I have ordered him to hasten forward and join Colonel Smith's command. We will march in the morning, and expect to encamp with Colonel Smith to-morrow night.

The expressman says Colonel Alexander would attempt to reach the valley of Salt Lake by the Bear river; it is much further than by

the usual route, and why he selects it I could not learn, unless from the probability of the grass being burned by the Mormons on the direct route. These men say that it is certain they will burn the grass on the route they are about to pursue. Under these circumstances, if I could communicate with Colonel Alexander, I would direct him to take up a good position for the winter at Ham's Fork. The road is beset between this and Ham's Fork with companies of Mormons, so that it is doubtful whether I shall be able to communicate with Colonel Alexander.

With great respect, your obedient servant,

A. S. JOHNSTON,

*Colonel 2d Cavalry, Commanding Army of Utah.*

Major IRVIN McDOWELL, *Assistant Adjutant General,*

*Headquarters of the Army, New York City.*

WASHINGTON, D. C., *November 6, 1857.*

GENERAL: In my hurried report to the commanding general of the army of Utah, dated at Ham's Fork, September 16, 1857, I omitted to enclose the correspondence between Governor Young and myself in relation to obtaining supplies for our troops upon their arrival in Utah.

Deeming it proper that this correspondence should be laid before the honorable the Secretary of War, I have the honor to forward it through the proper channel for that purpose.

I am, general, very respectfully, your obedient servant,

STEWART VAN VLIET,

*Captain, Assistant Quartermaster.*

Major General T. S. JESUP,

*Quartermaster General, U. S. A.*

GREAT SALT LAKE CITY, *September 10, 1857.*

GOVERNOR: The communication from General Harney, which I had the honor to deliver to you yesterday, has made you acquainted with the object of my visit to this Territory, viz: to procure certain supplies for the troops now "en route" for Utah.

As it is late in the season, it is possible that the troops may not be able to reach here the present year; but should they succeed in doing so, the following articles will be required, viz: from 50,000 to 75,000 bushels of oats, corn, or barley; 1,000 tons of hay, and some 150,000 to 200,000 feet of assorted lumber.

I do not deem it proper to make contracts for the delivery of the above articles, owing to the uncertainty attendant upon the arrival of the troops; but I should be glad to ascertain if they can be obtained by purchase in open market, at fair market prices, by the assistant quartermasters who accompany the troops when they arrive here.

When the troops get through the mountains, they will also require some fuel on their march to Rush valley, or whatever other point may

be selected, and I should be glad to know if fifty cords of dry wood could be had in the city to be taken up by the wagons as they pass through it.

I am, governor, very respectfully, your obedient servant,  
 STEWART VAN VLIET,  
*Capt., Ass't Quartermaster.*

Governor BRIGHAM YOUNG,  
*Territory of Utah.*

GOVERNOR'S OFFICE, TERRITORY OF UTAH,  
*Great Salt Lake City, September 11, 1857.*

CAPTAIN: Your communication of the 10th instant is before me, and, as you state, the letter from General Harney, addressed by him to "President Brigham Young, of the society of Mormons," and which you, in person, presented to me on the 9th, gave me a general outline of the official duties expected to be devolved upon you on your arrival in this Territory.

It is probable that the number of bushels of "oats, corn, or barley," and the quantity of hay and lumber, specified by you as likely to be required for certain troops "en route" for Utah, in case they should arrive here this season, could be procured. But it must be obvious to yourself that, from the uncertainty of the arrival of the troops mentioned, even in your view, in consequence of the lateness of the season, and the already falling of snow on the mountains, and the consequent well-grounded hesitancy on your part to "make contracts for the delivery of the above mentioned stores," the question touching any definite amount, pending an uncertain future contingency which, owing to the instability of human affairs, may never arrive, and especially large amounts in so newly settled a country, which has so recently been pinched close upon starvation, is too difficult of solution to admit of being determined from the information at present before me.

In reference to your inquiry concerning the possibility of the assistant quartermasters who accompany the troops being able, in case those troops should arrive, to purchase "in open market" the stores your knowledge of their condition presupposes they might require, it is supposable that such a course might accomplish the object in view. But since it is the usual practice of our government to advertise for sealed proposals for the contract and delivery of the stores named in your letter, it leaves a wide margin for difference of opinion, even among men the most experienced in these matters, as to which method of trying to bargain, under contingencies, would best subserve the public interest; which I am happy in believing that you, captain, as well as myself, take a lively interest, and use all reasonable effort to promote.

As to the few cords of wood that you might require for troops passing from this city to Rush valley, should they get through the mountains and wish to pass upon that line, it is highly probable that the requirement for so small a quantity, should all the previous contin-

gencies alluded to by you pave the way to that result, could be easily managed by the quartermasters accompanying the march, and be procured in the neighborhood where they might pass, as there are large quantities of the kind of wood specified by you already in the city.

I am, captain, very respectfully, your obedient servant,  
BRIGHAM YOUNG,

*Governor and ex officio Sup't of Indian Affairs.*

Captain STEWART VAN VLIET,

*Assistant Quartermaster U. S. army,*

*Great Salt Lake City, Territory of Utah.*

WASHINGTON, D. C., November 20, 1857.

SIR: I have the honor herewith to enclose my report to Colonel Johnston, commanding the army for Utah, dated at Ham's Fork, September 16, 1857.

As the instructions under which I repaired to Utah related purely to military matters, I confined myself, in my report, exclusively to them; but in the course of my interview with Governor Young and the leading men among the Mormons, other subjects were brought up—such as, the reason for sending troops to Utah, the intention of the government towards the Mormons as a religious sect, &c., &c.; and as it may be of importance to the authorities to know what I told them in relation thereto, I will briefly state the substance of what occurred at these interviews.

In explaining to Governor Young the object which the government had in view in sending troops to Utah, I told him that the Territory of Utah had been organized into a separate military department the same as Florida, Texas, Kansas, and other portions of the United States had been, and the troops crossing the plains had been simply ordered to take post in it. I told him, further, that I had seen the orders which were to govern the commanding officer of the troops, and that they contained no intimation whatever that the troops would or could be used to molest or interfere with the people of Utah. I explained that the troops could only be called upon to interfere when the authority of the government was set at defiance, and only then as a "*posse comitatus*," on the requisition of the governor of the Territory, the same as then obtained in the Territory of Kansas.

I also told them that I was convinced that the intentions of the government towards the people of Utah were of the most pacific nature; that the past was forgotten, and that, as the Constitution of the United States guarantied to each one entire freedom in religious matters, I was certain that Governor Cummings would have no instructions that could in any way interfere with the Mormons as a religious people. I stated that I had seen Governor Cummings just before I left the frontiers, and had he had any such instructions I would have been made acquainted with them.

In making these statements to Governor Young and other citizens of Utah, I was governed by the desire to allay, if possible, the hostile feeling which I plainly saw existed towards the United States, and

to place before them the action of the government in its true light. I was soon convinced, however, that Governor Young had decided upon the course he intended to pursue; and could I have laid before him the most pacific intentions of the government, over the signature of the President himself, it would not have turned him from it.

At present Governor Young exercises absolute power, both temporal and spiritual, over the people of Utah, both of which powers he and the people profess to believe emanate directly from the Almighty. Hence the opposition of the people to a new governor, and the remark of Governor Young, that should Governor Cummings enter the Territory, he would place him in his carriage and send him back.

I heard Elder John Taylor, in a discourse to a congregation of over 4,000 Mormons, say that none of the rulers of the earth were entitled to their position unless appointed to it by the Lord, and that the Almighty had appointed a man to rule over and govern his Saints, and that man was Brigham Young, and that they would have no one else to rule over them.

In conclusion, I would also state that Governor Young informed me that he had no objection to the troops themselves entering the Territory; but if they allowed them to do so, it would be opening the door for the entrance of the rabble from the frontiers, who would, as in former times, persecute and annoy them; and to prevent this, they, the Mormons, had determined to oppose all interference of the government in the affairs of their Territory.

I am, very respectfully, your obedient servant,

STEWART VAN VLIET,

*Captain, Ass't Quartermaster.*

Hon. J. B. FLOYD,  
*Secretary of War.*

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## No. 2.

### REPORT FROM BUREAU OF EXPLORATIONS AND SURVEYS.

WAR DEPARTMENT,  
*Office Explorations and Surveys, Washington, Nov. 30, 1857,*

SIR: In obedience to your several instructions of May 6 and 16, communicated through me, the following expeditions have been organized and taken the field.

First. An expedition to continue the experiment of sinking artesian wells upon the public lands, for which an appropriation of \$100,000 was made by the last Congress.

This duty was assigned by you to Captain John Pope, topographical engineers, who was directed to resume the work at the well near the Pecos, and to prosecute it until the water flowed out continuously upon the surface; next, to complete the experiment begun near the Rio Grande; and, these two works having been finished and left in serviceable order, to continue the experiment on the plains or basins east of the Rio Grande, at points upon, or as near as practi-

cable to, lines of military and emigrant roads, and especially upon a portion of the route from Independence to New Mexico.

Captain Pope arrived at his former camp on the Pecos on the 2d September, and, at the date of his last communication, October 1, had nearly completed the removal of the sand and mud that had accumulated in the well.

Second. Under the appropriation for surveys for military defences, geographical explorations, and reconnaissances for military purposes, an expedition was entrusted to Lieutenant G. K. Warren, topographical engineers, the object of which was to ascertain the best route for military communication from the Missouri river to Fort Laramie and the South Pass, in extension of the road between Fort Snelling and the mouth of the Big Sioux; to explore the Black Hills about the sources of the Shyenne and Little Missouri rivers, and to examine the Niobrara, or Rapid river, to ascertain its character and resources, and the practicability of opening a road along that stream between Fort Randall and Fort Laramie.

These duties have been successfully executed under many embarrassments and difficulties, the party having reached Sioux City on the 16th November.

Third. Under the same appropriation, an expedition has been organized under the command of Lieutenant J. C. Ives, topographical engineers, for the exploration of the Colorado of the West.

It is anticipated that the labors of this party will make known the practicability of navigating the Colorado with steamers, in lowest water, to within 500 miles of the Great Salt Lake; the nearest points to that lake accessible by water, so far as yet known, are on the Missouri, 1,100 miles distant, and on the Pacific coast 900 miles distant.

The nature of this duty required peculiar preparations, which have been made, and the expedition when last heard from, October 19, was at San Francisco, en route to the field of labor.

The reports, maps, and drawings of the exploring parties commanded by Lieutenant Williamson and Lieutenant Parke, have been received, and, with the exception of the maps, printed.

Very respectfully, your obedient servant,

A. A. HUMPHREYS,

*Captain Topographical Engineers, in charge.*

HON. JOHN B. FLOYD,

*Secretary of War.*

## No. 3.

REPORT ON CAPITOL EXTENSION, RECONSTRUCTION OF DOME, AND POST  
OFFICE EXTENSION.OFFICE OF THE EXTENSION OF THE CAPITOL,  
*Washington City, November 30, 1857.*

SIR: I have the honor to report the progress during the past year of the works of the extension of the Capitol.

The two wings of the extension are roofed in. Portions of **the** cornice of the exterior, and of the blocking course over the cornice, **are** set.

Immediately after the adjournment of Congress, the grounds between the wings and main building was excavated, and the foundations of the boiler-vaults, and of the connecting corridors, and coal passages, were commenced.

*The boiler-vaults*, which are very extensive, and which are placed under the terraces outside of the building, have been arched over; and the boilers, which have been placed in them, are now being fitted for immediate use.

*Connecting corridors*.—Of these the foundations are completed, and the lower stories are built and arched over, and the walls of the principal story have made some progress.

It is hoped that in the first week of December the masonry of the attic floor of the south connecting corridor may be completed; thus affording a sheltered passage from the old to the new representative chamber.

*Vestibules*.—The marble columns, ceilings, &c., of the vestibules of the principal stories of both wings have been completed and set. The basement vestibules are finished.

A large portion of the interior of the buildings has been finished and prepared for use.

*Floors*.—The tile floors throughout the basement story are laid. A few missing tiles, and the floors of the rooms which have been occupied as the offices during the construction of the work, remain to be laid.

Part of the floors of the principal story of the south wing have been laid. Those of the clerks' rooms, on the west front, the floors of the corridors under the galleries of the house, and some others, are laid. The tiles for others are here.

*Stairs*.—The private stairs leading to the House of Representatives, and to the Senate Hall, have been completed, except the hand rail.

Upon the principal stairs much progress has been made; but they are yet unfinished.

*Rooms*.—Many committee rooms in the north wing have been finished. Some of them are painted and decorated; others are merely plastered.

The Hall of Representatives is nearly ready for occupation. The cast iron ceiling is completed and painted. The galleries are ready for the upholsterers. Their cast iron fronts are finished, the floors laid, and the carpet is being fitted. The marble work of the Speaker's

desk, and of those for the clerks and official reporters, is finished and set, and these desks will be ready for use by the meeting of Congress.

The desks for the members, and one-half of the chairs, are in the building. The other half of the chairs is daily expected.

The ornamental glass for the skylights of the Hall of Representatives has not arrived. It was ordered last spring, and the manufacturers undertook to deliver it by the 1st of September. They have failed to deliver it to this date; but it is hoped that it will be here by the meeting of Congress.

*Heating and Ventilation.*—Workmen are engaged night and day in fitting the connexions of the boilers of the south wing, and in endeavoring to recover time lost in their delivery. The makers of the boilers were one month behind time in delivering them. I hope, however, to be able to light the fires before the meeting of Congress.

The ventilating fan, I fear, cannot be completed in time; but the arrangements are such as to ensure a very tolerable action of the heating apparatus without the fan.

The heating apparatus of the south wing, with the exception of some connexions about the boilers and pumps, is finished; and all are expected to be in use by the first Monday in December.

This apparatus is one of the most extensive and complete in the world. Its arrangement and details have required a vast amount of study, of scientific and mechanical knowledge, and experience, in which I have been ably assisted by the manufacturers, Messrs. Nason & Dodge, and their agents.

When completed, and tried practically by a few months working, I hope to have time to make a special report to you upon its construction and principles.

It is a work of great interest to all persons engaged in the construction of public buildings in our variable climate.

*Marble.*—The mantels for the building are most of them completed, and in place. They are generally made from native marbles, though for variety some Italian marble has been used.

There had been delivered, by Messrs. Rice, Baird & Heebner, on 30th September, 1856, under their contract for marble for the extension, 238,451 cubic feet of marble from the quarries at Lee, Massachusetts, costing \$384,934.

The quantity of marble which had been purchased for the interior of the building, not under the contract of Rice, Baird & Heebner, was 30,434 cubic feet, costing \$85,569,47, of this a portion was Lee marble, but the greater part Italian and variegated marbles for the interior decoration.

There have been delivered during the year ending 30th September, 1857, under the contract of Messrs. Rice, Baird & Heebner, 47,783½ cubic feet of marble, costing \$87,833 13; and of Italian and other marbles, not under this contract, 13,331 cubic feet have been received, at a cost of \$50,530.

*Brick work.*—This has consisted principally in the flues under cellar floors for ventilation and heating; for passage of iron pipes, &c.; in the building of the air chambers, enclosing the heating coils; the air passages under the floor of the Representative chamber; the backing



of the gallery fronts of the same chamber ; the completion of some arches of the wings ; walls for carrying marble stairs ; laying floors of rooms and corridors, and of cellars ; and in the arches and walls of the boiler vaults and connecting corridors. There have been received during the year ending 30th September, 1,327,925 bricks, and 1,196,050 have been laid.

*Plastering.*—Many of the rooms and corridors have been finished in plaster, some of them with a plain, rough coat, to receive fresco painting, others highly finished with moulded ornaments, to remain unpainted.

*Roofs and roof gutters.*—The roofs of the wings are closed ; but we have been troubled during the year with leakage at the eaves, in consequence of the eave gutters not having been completed. These gutters are of cast iron ; the greater part of them are now in place. They are cast in sections with spigot and faucet joints like that used in cast iron water pipes, but arranged so as to be caulked with hemp gasket and red lead putty from the inside.

The gutters of a great building like this are always difficult to make tight, and to them, too generally, the gradual deterioration and decay of the building may be traced.

They are exposed to all the extremes of heat and cold, and it is very difficult to make efficient provision for expansion and contraction without leakage. I hope that I have succeeded with these gutters.

They are very heavy and difficult castings to make, requiring a constant alteration of patterns ; and I have been disappointed in my endeavor to procure them all during the summer.

The stairway roofs have all been completed and glazed with  $\frac{3}{8}$ -inch thick rough plate glass. They appear to be perfectly tight.

*Iron work.*—In addition to the ceilings of the House and Senate chambers, which are finished and painted, the ceilings of the rooms under the galleries of the House, of the members' retiring room, and the fronts of the House galleries have been completed.

The fronts of the Senate galleries and the ceilings of the rooms under the Senate galleries are being delivered, and will be erected during the winter.

The door frames and window casings and linings throughout the building are of cast iron, and they are nearly all complete and set in the walls.

Those for the corridors are here and ready to be set.

*Carpentry.*—Window sash and frames throughout the building are of wood. They are completed, and where the masonry has been prepared for them they have been set.

The floor of the House of Representatives, floor and seats of the galleries, book shelves in some of the rooms, doors and shutters generally throughout the building, shops, scaffolds, and other auxiliary works have required a large force of carpenters to be employed throughout the year.

*Sculpture.*—The models for the pediment have all been received, and most of them have been executed in marble.

The America, the Indian Chief, and the Hunter are now in hand ; the others are completed.

Mr. Crawford, who designed and executed the original models of this pediment, has died during the year. His loss will be felt by all those who desire the advancement of art in this country. He left some works intended for the Capitol unfinished; but it is a source of satisfaction to all lovers of art that he was able to complete this greatest work of sculpture yet attempted by any American. And the designs and models for his other works intended for the Capitol, I am informed, are in such a state that there will be no difficulty in completing the works in the spirit and with all the beauty of his original conceptions.

Niches have been provided above the galleries of the Representative hall and Senate chambers; and I suggest that it would be well to call the attention of Congress to the propriety of making arrangements for filling these niches with commemorative statues of distinguished citizens.

*Painting.*—Several of the committee rooms, of both the north and south wings, have been painted and decorated; others remain unfinished.

The cast iron ceilings of the Representative and Senate chambers have been painted in a very rich and elaborate style, which style it is intended to carry out in the remaining decorations of the rooms.

*Drainage.*—In order to drain the building, a brick sewer about one-half mile in length has been constructed, leading along the western front, connecting with drains under the middle of each wing, into which all the water from the acres of roof and from the wash-stands, water-closets, &c., flows through iron pipes. This sewer empties into the canal to the southwest of the Capitol.

It will serve also to drain the grounds, and the streets and squares in that quarter of the city.

*Gas.*—Gas pipes have been laid throughout the wings, and gas fixtures prepared for the hall of Representatives and many of the rooms and corridors.

A ten-inch main has been laid, connecting with the mains of the gas company, and passing up the street on the south of the Capitol to the eastern front, where it divides into two eight-inch mains, which supply the wings and the old building.

Two large station metres have been placed under the connecting corridors, by which the quantity of gas consumed will be registered.

When all the lights throughout the building (as may be the case during a night session) are in use, the quantity of gas required will be beyond the ability of the city gas company to supply, without interfering with the supply of the city. As this great demand is not constant, but liable to occur suddenly, and sometimes for two or three nights in succession, the gas company cannot provide for it except by providing a separate gasometer, in which a surplus can be stored up to meet this sudden demand. The cost of this gasometer would not be repaid to them by this occasional consumption; and, after investigating the subject, I had the honor to report to you that it would, in my opinion, be proper for the government to provide a gas-holder for the use of the Capitol alone.

This matter remains unacted upon, and it should, I think, be brought to the attention of Congress at this session.

There has been applied during the year ending the 30th of September, 1857, 138,654 days' work upon the United States pay-rolls, and 81,372 days' work by those employed by the contractors about the building, in all 220,026 days' work; which sum is exclusive of the large forces employed at the marble and granite quarries, and in the various private workshops whose resources have been made available for the building.

*Cash Account.*

Amount available 30th September, 1856.....	\$706,695 91
Amount appropriated 3d March, 1857.....	900,000 00
	<hr/>
	1,606,695 91
Amount in treasury undrawn 30th September, 1857.....	\$660,000 00
Deposited with Treasurer of the United States at Washington, and assistant treasurers at New York and Philadelphia, subject to checks of superintendent, on 30th September, 1857 .....	63,906 44
Cash in hand for pay-roll .....	280 60
	<hr/>
Amount available 30th September, 1857.....	724,187 04
Amount expended in year ending 30th September, 1857 .....	882,508 87
	<hr/> <hr/>

The following appropriations have been made for the extension of the Capitol, viz :

Appropriation of 30th September, 1850.....	\$100,000 00
Joint resolution of 14th April, 1852.....	500,000 00
Deficiency bill for year ending 30th June, 1853.....	400,000 00
General appropriation bill for year ending 30th June, 1854 .....	600,000 00
General appropriation bill for year ending 30th June, 1855 .....	750,000 00
Army appropriation bill for year ending 30th June, 1856 .....	325,000 00
General appropriation bill for year ending 30th June, 1857 .....	750,000 00
General appropriation bill for year ending 30th June, 1858 .....	900,000 00
	<hr/>
Total appropriated.....	4,325,000 00
Of which there has been expended to 30th September, 1857 .....	3,600,812 96
	<hr/>
Leaving available for the fiscal year ending 30th June, 1857 .....	724,187 04
	<hr/> <hr/>

All which is expected to be expended by the 1st of June next.

Amount required for the service of the year ending 30th

June, 1859..... 1,000,000 00

All of which is respectfully submitted by your obedient servant,

M. C. MEIGS,

*Captain of Engineers, in charge.*

Hon. J. B. FLOYD,

*Secretary of War.*

OFFICE OF THE EXTENSION OF THE U. S. CAPITOL,  
*Washington City, November 30, 1857.*

SIR: I have the honor to report the progress of operations for rebuilding the dome of the Capitol.

At the date of my last annual report the old dome had been removed, a temporary roof built over the rotundo, the machinery, derricks, cranes, steam engine, and hoisting apparatus prepared, and the operation of rebuilding the upper part of the rotundo wall, in good masonry, to receive the iron work, was in progress.

The winter suspended operations upon this work. In the spring it was resumed, and the wall was carried up in brick and cement, with hoop-iron bond, the joints of the old exterior facing of sandstone being grouted and made solid with cement mortar to near the level of the top of the cast-iron brackets, which directly receive the weight of the iron superstructure, and which support upon their outer ends the columns of the peristyle.

These brackets, which weigh about two and a half tons each, are embedded in the brick work, held together by the brick, iron, and cement bond, and by a heavy wrought-iron band, also embedded in the brick work. Strong wrought-iron screw bolts also connect their outer ends, forming a continuous hoop of wrought-iron. There are seventy-two of these brackets, weighing in all 479,923½ pounds.

Upon these rest one hundred and forty-four pillars of cast-iron, twenty-three feet ten and three-quarter inches in height, averaging in weight 4,942 pounds each. These are firmly connected by cast and wrought-iron braces and bolts, and form the skeleton of the wall or drum of the dome from the floor of the peristyle to the top of the columns. Many of these are in place, and others are being daily delivered, fitted, and hoisted to their places.

The ends or bearing surfaces of these pillars are turned in a lathe, or planed in a heavy vertical planing machine, which was designed and built for this special purpose.

The frame of each of the thirty-six piers between the windows of the principal stage of the dome is composed of a group of four of these pillars, with their cross-braces and ties.

Upon these will rest another tier of heavy castings, which will be connected with the entablature upon the top of the columns by cast and wrought-iron braces and ties. These castings are being made.

The columns are all made and fitted. Some of them have been set. Others will be set as the fitting and setting of the floor-plates of the collonade is completed.

The drawings of the details of entablature of windows, of pilasters, and of the skin or outside covering generally of this stage of the dome are completed, and arrangements are being made for the casting and manufacture of the iron work.

The drawings of the next stage are in progress.

The great difficulty and complexity of this structure—one of the most complicated and difficult works of engineering and architecture ever attempted—have made it impossible to complete all the studies for it as rapidly as I had hoped; but a great quantity of work is now in hand, and will be set during the early part of the next season.

*Cash Account.*

Available 30th September, 1856.....	\$156,914 85
Appropriated in 1857.....	500,000 00
	<hr/>
	656,914 85
Expended in the year ending 30th September, 1857.....	54,720 93
	<hr/>
Available 30th September, 1857.....	602,193 92
	<hr/>

No appropriation is asked for the next fiscal year, as the sum now available will be as much as can be judiciously applied during the year.

Respectfully submitted.

M. C. MEIGS,  
*Captain of Engineers, in charge.*

Hon. J. B. FLOYD,  
*Secretary of War.*

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OFFICE OF THE EXTENSION OF THE U. S. CAPITOL,  
*Washington, November 30, 1857.*

SIR: I have the honor to report the progress of the work upon the continuation of the General Post Office building during the past year.

At the date of my last annual report the basement story had been raised to its full height, except upon that part of the east front occupied by the city post office.

The exterior walls have generally, except in the middle of the east and north fronts, been raised near to the level of the architrave.

The pavilion in the court yard, and the basement rooms of the north front, are nearly completed, and will, in a few days, be occupied by the city post office.

Most of the basement rooms of the north front have been plastered, and are being got ready for use. Some of them are already occupied by the Post Office Department.

The ceiling of the pavilion is of cast-iron, with glass sky-lights in the centre. This ceiling is completed and painted. The other ceilings of the building, with the exception of that of the large attic room in centre of north front, will be of plaster upon the under side of the iron and brick floors.

The floors generally throughout the new portion of this building are of brick, resting upon rolled-iron beams, weighing about thirty pounds to the lineal foot.

These floors occupy less room than groined brick arches, and allow the exterior walls to be made lighter, as they do not require the weight necessary to act as piers or abutments for heavy arches. They are perfectly fire-proof.

The doors and the window frames and sash are of wood, for the reason that any other material is so harsh and heavy as to be unpleasant to handle.

The door-frames and window-casings are of cast-iron, which is cheaper and less liable to injury than stone, and equally durable and fire-proof.

The floors will generally be laid with slabs of slate.

Most of the marble of this building has been delivered.

That for the north front comes from Lee, Berkshire county, Massachusetts; that for the east and west fronts from Baltimore county, Maryland. The granite is from the Patapsco quarries in Maryland.

Of the Maryland marble, we had received on the 30th of September, 1856, 15,485 cubic feet; of the Lee, or Massachusetts marble, 5,418 cubic feet; of the Patapsco granite, 14,164 cubic feet; of an inferior granite from Maine, used in the cellars, there had been received 4,346 cubic feet. There had been received, also, 885,527 bricks.

During the past year there have been delivered: Of Maryland marble, 9,249 cubic feet; costing \$12,915. Of Lee marble, 13,468 $\frac{3}{4}$  cubic feet; costing \$25,590 62. Of Italian marble, 1,663 $\frac{7}{12}$  cubic feet; costing \$6,903 87. Of Italian marble columns, with shafts, in single pieces, 27 columns; costing \$40,500. Of granite, 13,078 $\frac{9}{12}$  cubic feet; costing \$7,833 20. Of bricks, 789,266. And 754,900 bricks have been laid in the work.

A supply of marble is now on the ground which will afford employment to a large force of stonemasons during the winter.

They are now engaged in carving the capitals of columns, pilasters of exterior, the cornice, and the entablature, much of which will be ready to be set early in the spring.

*Cash Account.*

Amount available 30th September, 1856.....	\$379,825 17
Appropriation of 1857.....	200,000 00
	<hr/>
	579,825 17
Expended in the year ending 30th September, 1857.....	221,536 09
	<hr/>
Amount available 30th September, 1857.....	358,289 08
Appropriation necessary for the service of the fiscal year ending 30th June, 1859.....	100,000 00
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Very respectfully, your obedient servant,

M. C. MEIGS,  
*Captain of Engineers, in charge.*

Hon. J. B. FLOYD,  
*Secretary of War.*

## No. 4.

## REPORT FROM THE COMMANDING GENERAL.

HEADQUARTERS OF THE ARMY.

*New York, November 20, 1857.*

SIR: As the immediate commander of the army, under the President, I have the honor to submit the usual annual report on its general condition and wants.

Our regiments, horse and foot—including artillery (serving, mostly, as infantry)—are, as I have remarked in former reports, anything but a peace establishment. For years they have been almost constantly in pursuit of hostile Indians, through swamps and mountains, in heats and snows, and with no inconsiderable loss of life from frequent combats, and a still greater mortality from excessive labor, deprivation, and disease. In other wars those hardships are occasionally broken by rest and comfort, now long unknown to nine-tenths of our troops, and hence another great evil—the numerous desertions which daily thin their ranks.

As a partial illustration of the extraordinary activity and sufferings I have spoken of, I beg leave to annex copies of two of my orders, Nos. 4 and 14, of the present year.

To mitigate those evils, and to enable us to give a reasonable security to our people on Indian frontiers, measuring thousands of miles, I respectfully suggest an augmentation of at least one regiment of horse, (dragoons, cavalry, or riflemen,) and, at least, three regiments of foot (infantry or riflemen.) This augmentation would not more than furnish the reinforcements now greatly needed in Florida, Texas, New Mexico, California, Oregon, Washington, (T.) Kansas, Nebraska, and Minnesota, leaving not a company for Utah.

If the reinforcements should be authorized as early as January, it would be easy, in the present unfortunate want of profitable employment for the thousands of able-bodied men to be found idle in every populous district of the country, to make the number of recruits needed, and in time for them to reach the theatres of military operations in the summer and autumn of 1858. Of the relief which the measure would afford to our general population, I may not speak in a military paper; but to the army, and exposed frontiers under its protection, it would be immense.

It is eminently desirable, by all the reasonable means at the disposition of the government, to attempt the moral elevation of our enlisted men, that is, all below commissioned officers. In physical comforts, whether they are sick or in health, the justice of Congress, in respect to physicians, medicines, hospital stores, the pay, clothing, and subsistence of every body, has scarcely left anything to be asked for. (The subject of quarters will be noticed in the sequel.) So, too, in respect to religious instruction, through some twenty odd military chaplains, considering the great number of sects and the habitual dispersion of the troops, I have nothing practical to suggest. But to render the service honorable, so that citizens may freely enlist without the fear

of harsh, arbitrary, or capricious treatment at the hands of any superior, some additional legislation seems indispensable. I allude to a revision of the "rules and articles for the government of the armies of the United States," and particularly the 45th, 65th, 66th, 67th, and 99th of those articles, all respecting the administration of justice, in order, among other things, to provide for the *legal* punishment of petty offences (substituting, when necessary, courts consisting entirely of sergeants,) so as to deprive commanders of small detachments and isolated companies of all pretext (the want of officers to compose courts, &c.) for taking the law into their own hands. Accordingly, I recommend that the subject be, in the first instance, referred to a board consisting of intelligent officers of great experience with troops, and, if their report be approved, that it next be submitted to Congress. (The same board might, with great benefit, revise the General Regulations for the Army, and the conflicting systems of infantry tactics now in force.)

In connexion with penal justice, it is due to all good men in the ranks to say that they are directly interested in the suppression of crimes, "disorders and neglects," "prejudicial to good order and military discipline," inasmuch as offences hurt the just pride of the corps, and every offender put under guard or in arrest increases the duties and fatigues of his meritorious companions of the same class or rank.

I have a word to say in respect to quarters for troops. On the sea-boards, in our regular fortifications, we have but little shelter other than casemates for fighting siege guns, and these arches are too damp, and otherwise uncomfortable, for the lodgings of the troops. In respect to the Indian frontiers—except at one or two interior points for reserves—the troops are, when they chance to be allowed short rests, either in tents (winter as well as summer) or such miserable bush and mud huts as they have hastily constructed for the moment. Hence another cause of desertion, disease, and mortality. It is true that the frontiers are constantly shifting by the extension of settlements, and hence a great difficulty in providing permanent quarters, except for reserves, and we are far from having a regiment, or even a company, to be so posted.

The instruction of our artillery regiments in their appropriate duties, with light and heavy batteries, has been much neglected of late years. 1. By capriciously dismounting several of the light companies, and sending others to the most unsuitable posts in respect to supplies of health; and, 2. By the necessary employment (from deficiency in other troops) of the greater part of each regiment, as infantry, on the Indian frontiers.

A *school of practice*, however, for garrison, sea-coast, and siege artillery, is now being organized on a small scale, at Fortress Monroe, to be enlarged as the regiments may be withdrawn from the Indian frontiers, when, also, on re-garrisoning our principal fortifications, each may be made a subordinate school. In the meantime, I respectfully ask that the light companies remaining on foot be remounted, as authorized by law.



Of recommendations in former reports, I beg leave specially to recall two:

1. A system of recruiting by, and for the respective regiments, which, it is conceived, would create and nurture the *esprit de corps*—a family feeling in each—always highly conducive to moral elevation of military efficiency.

2. A revision of the *pension laws*, so as to place the army on a like footing with the navy, volunteers, and militia, in this respect, as there can be no conceivable reason of any sort for a discrimination to our prejudice. (Please see vol. 2, p. 229, of the President's Message, &c., December, 1856.)

I have the honor to be, sir, with high respect, your most obedient servant,

WINFIELD SCOTT.

Hon. J. B. FLOYD,  
*Secretary of War.*

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### *General Orders, No. 4.*

HEADQUARTERS OF THE ARMY,  
*New York, March 30, 1857.*

The general-in-chief takes pleasure in announcing the satisfaction felt by the head of the War Department, as well as by himself, in learning, from official reports, the creditable conduct and energy displayed by the troops in various small conflicts with the Indians, as follows, in the order of time:

1. Lieutenant Robert C. Wood, jr., and his scouting detachment, of the 2d cavalry, pursued an Indian trail for three days, overtook the party near the north fork of the Concho, Texas, February 13, killed three, and captured two survivors, with all the animals and property—a complete success, without loss or serious hurt to the victors.

2. Sergeant Walter McDonald, with a small detachment of company D, 2d cavalry, from camp Verde, Texas, vigorously pursued, and, February 13, successfully attacked a party of hostile Indians—killing four, and capturing all their animals. Private Martin, of company D, 2d cavalry, died of the wounds then received.

3. Lieutenant Edmund Freeman, 5th infantry, reconnoitering with a small party in the Big Cypress Swamp, near Bowleg's town, Florida, was attacked by the Seminoles, March 5, himself and three of his men severely wounded and one man killed.

Captain Carter L. Stevenson, 5th infantry, with his command, called, by express, from Fort Keats, twenty miles distant, came rapidly to the relief of Lieutenant Freeman's party, attacked the enemy, and, after a gallant skirmish, put them to flight—with an evident loss to the Indians, the extent of which could not be ascertained, owing to the density of the hammock.

The loss of the troops was as follows:

*Killed.*—Privates Chilton, company G; McKinn, company I; and, McClusky, company D, 5th infantry.—3.

*Died of Wounds.*—Private Bohmer, company G, 5th infantry.—1.

*Wounded.*—Second Lieutenant Edmund Freeman, (in the arm, severely;) Sergeant Taylor, company H; privates Gallagher, company H; Donnelly, company K; and Mingle, company G, 5th infantry.—5.

By command of Brevet Lieutenant General Scott.

L. THOMAS,

*Assistant Adjutant General.*

*General Orders, No. 14.*

HEADQUARTERS OF THE ARMY,

*New York, November 13, 1857.*

1. In announcing to the army the more recent combats with hostile Indians, in which the gallant conduct of the troops, under, in most cases, circumstances of great hardship and privation, is entitled to high approbation, and the general-in-chief takes occasion to notice all those of a similar character, not mentioned in his general order No. 4 of the current series, which have occurred since the beginning of last year, and to which, since the publication of that order, his attention has been directed. They are too interesting to be omitted.

In the order of time, the cases are as follows:

I. On the 17th of February, 1856, Captain James Oakes, with a part of his company C, 2d cavalry, from Fort Mason, Texas, after a pursuit of six days, and on the ninth day from his post, overtook a party of seven or more Indians; killed one and wounded several others; capturing all their animals and other property; Sergeant Reis and Private Kuhn severely wounded. The troops were exposed to very cold and wet weather, and for more than seven days subsisted on two days' allowance of bread and coffee, such game as they could kill, and the flesh of horses they were obliged to abandon.

II. March, April, May, and June, 1856. The general commanding the department of the Pacific, at the time of the occurrences below mentioned, presents, as entitled to commendation and especial notice, the following cases:

First, that of Brevet Lieutenant Colonel Robert C. Buchanan, 4th infantry, having under him companies C, 1st dragoons, B and H, 3d artillery, B, E, F, and G, 4th infantry, who, in less than three months, after traversing the mountains and valleys of the Rogue river, during which the troops had a number of severe conflicts, and in which they conducted themselves to the entire satisfaction of their commander, compelled the Indians to surrender at discretion, thus terminating the war in southern Oregon.

Brevet Lieutenant Colonel Buchanan's conduct is spoken of as gallant, energetic, and judicious; and, whilst all of his command are considered entitled to commendation, the following are specially noticed: Captain A. J. Smith's company, C, 1st dragoons; Captain E. O. C. Ord's company, B, 3d artillery; Brevet Major J. F. Reynold's com-

pany, H, 3d artillery; and Captain C. C. Augur's company, G, 4th infantry. Company C, 1st dragoons, lost eleven men killed, and eighteen wounded. Companies H, 3d artillery, and G, 4th infantry, killed twenty of the enemy, and took several prisoners, with four canoes, rifles, and ammunition. Company B, 3d artillery, killed five warriors, and captured five horses, a quantity of supplies, and some ammunition.

And, second, the operations on Puget's Sound of the troops commanded by Lieutenant Colonel Silas Casey and Major Robert S. Garnett, 9th infantry, and Captain E. D. Keyes, 3d artillery.

The conduct of these officers is highly commended for skill, perseverance, and judgment. The forces under their commands were companies M, 3d artillery, A and D, 4th infantry, and B, D, H, and K, 9th infantry. Their conduct is represented as worthy of high praise.

Lieutenant Augustus V. Kautz, 4th infantry, (wounded,) and Lieutenants Robert H. Davis and David B. McKibbin, 9th infantry, are commended for their gallantry in the engagement with the Indians on White river. The loss in these operations not stated.

III. On the 21st of March, 1856, Corporal William Fletcher and six privates of company F, 1st artillery, from Fort McIntosh, Texas, overtook and attacked a party of Indians on the Rio Grande, wounded two of them, and captured three horses.

IV. In March, 1856, Sergeant M. Kelley, company H, 4th infantry, with eight men, gallantly defended a small block-house, and protected all the public property at the Cascades, Washington Territory, for two days, against a body of fifty Indians. He had one man, Private L. Rooney, killed, and two, Privates F. Bernaud and O. McManus, wounded—the latter since dead of his wounds.

V. April, 1856. A detachment of thirty dragoons, commanded by First Lieutenant Isaiah N. Moore, 1st dragoons, with Second Lieutenant Horace Randal, sent out by Brevet Lieutenant Colonel D. T. Chandler, 3d infantry, from the force under his command, near the Almaigre mountains, New Mexico, came upon and charged a band of Gila Apaches in a *cañon*; killed one, wounded several others, of whom three subsequently died, and captured their prisoners, baggage, sheep, horses, and mules.

Private Allen, of Company I, severely and dangerously, and Private Fox, of company D, 1st dragoons, severely wounded.

VI. 7th of April, 1856. A detachment of one hundred and eight men from the 1st and 2d artillery, commanded by Brevet Major Lewis G. Arnold, 2d artillery, with Captain Samuel K. Dawson and Second Lieutenant George G. Garner, 2d artillery, were attacked by a large assembled force of Seminoles, in the Big Cypress swamp, Florida. The Indians were repeatedly charged and driven from the strong positions they successively occupied to the swamps and *hammocks*, but with what loss is not known.

Private John Simons, company L, 2d artillery, was killed; Corporal Joseph Carson, and Privates George Muller, John Strobell, company C, 2d artillery, and Private Thomas Newton, company L,

1st artillery, severely, and Privates Silas M. Watkins and William Abbott, company C, 2d artillery, slightly wounded.

VII. On the 13th of April, 1856, a party of fifty-five Indians were overtaken on the head waters of the Nueces by detachments from companies B and D, mounted riflemen, and F, 1st artillery, from Forts McIntosh and Duncan, Texas, under the command, respectively, of Captain Thomas Claiborne, jr., and Brevet Captain Gordon Granger, mounted riflemen, and Second Lieutenant George H. Elliott, 1st artillery. One Indian killed, and four made prisoners; their camp and all their animals captured.

The vigilance of the Indians and the character of the country, which enabled them to discover pursuit at a great distance, prevented a more complete success. In this case, from the time of leaving their posts until the termination of the pursuit, the troops marched three hundred and fifty miles in eight days. They suffered from want of water, and for four days, two in the pursuit and two after its termination, had no provisions but a small allowance of rice and coffee, accidentally obtained in crossing the El Paso road.

The mayor of Laredo, Sr. Don Santos Benevidas, Mr. Edward Jordan, and some twenty-five other citizens of that place, participated in this pursuit, and are represented as having rendered valuable service.

VIII. April 28, 1856. Brevet Lieut. Colonel Edward J. Steptoe, 9th infantry, commanding companies A, E, F, and I, same regiment, and detachments of company E, 1st dragoons, and company L, 3d artillery, (in all two hundred men,) at the Cascades, Washington Territory, repulsed the Indians in their attack of that place. The troops landed under fire, routing and dispersing the enemy at every point, capturing a large number of their mules, and destroying all their property. Second Lieutenant Philip H. Sheridan, 4th infantry, is specially mentioned for his gallantry.

IX. On the 25th of May, 1856, Captain James Oakes, 2d cavalry, with a detachment of that regiment from Fort Mason, Texas, came upon a party of Indians upon the Concho, and killed one.

X. On the 1st of July, 1856, Brevet Major Earl Van Dorn, 2d cavalry, with his company, under the orders of Brevet Colonel Robert E. Lee, same regiment, during an expedition from the northern posts of Texas to the sources of the Colorado and Brazos rivers, after a long pursuit, surprised a party of Comanches, killed two, took one prisoner, and captured twelve animals and other property.

XI. August 26, 1856, Captain George H. Stewart, with his own company, K, 1st cavalry, and detachments from companies E and G, under First Lieutenant Frank Wheaton, of the same regiment, (forty-one men in all,) from Fort Kearny, pursued and came upon a body of from seventy to eighty Cheyenne Indians, who had attacked the mail party. The enemy, after an attack, characterized by the department commander as spirited and skilful, were completely routed, with a loss of ten dead on the field, and as many more wounded, and their horses, mules, saddles, arms, &c., captured.

The conduct of the officers, Captain G. H. Stewart, First Lieutenant F. Wheaton, and Second Lieutenant James B. McIntyre, 1st cavalry, and of all the non-commissioned officers and men engaged, is

characterized as highly meritorious and honorable to themselves and the service. The gallant captain expresses his obligations to Mr. Edward Dillor, of Fort Kearny, also to Mr. Alexander Steward, and to the Sioux, Red Leaf, and Standing Elk.

XII. September, 1856, a detachment of troops from Fort Clark, Texas, commanded by Captain James Oakes, 2d cavalry, and composed of Captain Charles C. Gilbert and eighteen men of company B, 1st infantry; Second Lieutenant Henry W. Closson and twelve men of company I, 1st artillery, and Second Lieutenant James B. Witherell and thirty men of company C, 2d cavalry, penetrated the country between Fort Clark and the mouth of the Pecos, western Texas, hitherto not visited by troops, and considered very difficult of access. The expedition was conducted with so much judgment and energy, that in the operations of the day three parties of Indians were surprised between the Rio Grande and the Pecos, near their junction. Four of the Indians killed, and four wounded. Their animals and other property taken or destroyed.

XIII. November 25, 1856, Captain William R. Bradfute, with a detachment of nineteen men of his company, G, 2d cavalry, from Fort Mason, Texas, after a march of eight days, came upon and surprised a party of Comanche Indians near the head of the main Concho, killing four, wounding several, taking one prisoner, and capturing six of their animals. In the conflict Private John Curtis was severely wounded.

XIV. November 30, 1856, a detachment composed of men of company G, 1st dragoons, and company C, mounted riflemen, (in all twenty,) commanded by Second Lieutenant Horace Randal, 1st dragoons, followed a party of fifty warriors of the Gila Apaches, and after a chase of three hundred, and, in one day, of eighty miles—going over mountains and plains of snow, the trail frequently obliterated, without water for three days and nights—overtook the enemy, and attacked and drove them from the position of their own selection, recovering all the captured animals. Loss not stated.

XV. December 21, 1856, a detachment of seventeen men of company C, 2d cavalry, from Fort Clark, Texas, commanded by Second Lieutenant James B. Witherell, 2d cavalry, and accompanied by Second Lieutenant W. Owens, 2d cavalry, and Second Lieutenant E. W. H. Read, 8th infantry, both of whom had volunteered for the occasion, after a march of three days in diligent search of the enemy, came upon a party of Indians posted in a dense *chaparral*, on the bank of the Rio Grande, charged upon and drove them into and across the river into Mexico, killing two, wounding several, and capturing most of their horses, arms, and other property.

XVI. December 22, 1856, Captain R. W. Johnson, with twenty-five men of company F, accompanied by Second Lieutenant A. P. Porter, all of the 2d cavalry, after a march of seven days from Camp Colorado, Texas, came upon a part of Saneco's band of Comanche Indians near the head of the main Concho, charged upon and drove them into the *chaparral*; dismounted and followed them in, killing three, wounding three, and capturing thirty-four horses and all their camp equipage. In this sharp conflict Bugler Campion and Private

Lamb were killed by arrow shots through the heart, and Sergeant Gardnier and Private McKim slightly wounded.

XVII. March 9, 1857, Brevet Captain Alfred Gibbs, mounted riflemen, commanding a detachment of sixteen men of company G, same regiment, from Fort Fillmore, New Mexico, pursued a party of Mimbres Apache Indians, and on the second day out overtook and attacked them with such vigor as to kill six dead upon the field, and mortally wounding the seventh. The animals stolen by the Indians were all recovered. In this sharp and entirely successful conflict Brèvet Captain Gibbs received a severe wound in the body from a lance. His gallantry in this affair is, most justly, highly praised by his department commander.

XVIII. March 11, 1857, Second Lieutenant Lawrence S. Baker, mounted riflemen, with a small detachment from company B, same regiment, from Fort Thorn, New Mexico, after a hot pursuit continued through the night, came, at a place known as *Ojo del Muerto*, upon a party of Indians, supposed to be Mescalero Apaches, or Kioways, who had run off the animals of the United States surveying party, and succeeded in routing them, recapturing the stolen animals, as well as those belonging to the Indians, together with their other property. The exact loss of the Indians not known.

Lieutenant Baker's conduct in this affair has been commended by the department commander. His loss was, Private Patrick Sullivan, killed, and Private Bernard Dougherty, mortally wounded, (since dead,) Sergeant P. Duggan, Corporal John Brady, and Musician Thomas Reed, wounded.

XIX. April 4, 1857, First Lieutenant Walter H. Jenifer, 2d cavalry, with thirteen men of company B of that regiment, after a search of thirteen days, and a march of nearly three hundred miles, came upon a fresh trail of Indians near the head of the north fork of the Nueces river, Texas; and, as the trail lead into a rocky country, almost impracticable for cavalry, he dismounted, left his horses with a guard, and continued the pursuit with only seven men. After a tedious march of four miles, he suddenly came upon a camp occupied by from eighty to one hundred Indians. Approaching it, under cover, to within two hundred and fifty yards, and he and his little party being discovered, they were attacked by all the warriors in the camp, and threatened at the same time by a party returning to it with horses. He repulsed the Indians, with a loss to them of two killed and one wounded. It being then night, he withdrew his men, rejoined his horses, and returned to the attack the next day, but in the meanwhile the Indians dispersed.

For the last three days this detachment had no rations, having been out seventeen days.

XX. June 27, 1857. The southern column—commanded by Lieutenant Colonel Dixon S. Miles—of the Gila expedition under Colonel B. L. E. Bonneville, 3d infantry, composed of detachments from companies B, D, G, and K, 1st dragoons, B, G, and K, mounted riflemen, C, F, and K, 3d infantry, and B and I, 8th infantry, with a company of guides and spies, composed of Puebla Indians, and Captain Blas Lucero's Mexicans—in all some four hundred men—



after a march of twelve days from the dépôt on the Gila river, New Mexico, came upon a band of Coyotero and Mogollon Apaches, killed twenty-four; took twenty-seven prisoners; captured or destroyed all their property; and "rescued a Mexican boy from captivity." The following named officers and men were wounded, most of them slightly:

*1st Dragoons.*—Second Lieutenant Benjamin F. Davis; Corporal Anderson, (twice, once with an arrow and once with a bullet;) and Private Donnelly, company G.

*3d Infantry.*—Second Lieutenant Alexander E. Steen, Sergeant James Heron, company K, and Privates Johnson and McNamara, company C.

Very special mention is made, by all the superior commanders, of Captain Richard S. Ewell, 1st dragoons, to whom the credit is given of planning the action and breaking the enemy.

Colonel Bonneville gives "much credit" to Second Lieutenant A. McD. McCook, 2d infantry, for "the admirable manner in which he managed his Puebla Indians."

Great credit is also given by their commanders to the following named officers and men:

*Medical Staff.*—Assistant Surgeon John M. Haden.

*1st Dragoons.*—First Lieutenant I. N. Moore; Second Lieutenants Alfred B. Chapman and Benjamin F. Davis; Sergeant N. Pishon, company B; Corporal J. Anderson and Privates Donnelly and R. Walsh, company G; Lance Corporal W. Lambert and Private N. Brewer, of company D.

*Mounted Riflemen.*—Captain Thomas Claiborne, jr., and Second Lieutenant J. V. D. Dubois.

*3d Infantry.*—First Lieutenant William D. Whipple and Second Lieutenant A. E. Steen; Sergeant J. Heron and Private John S. Harper, company K; Privates Thomas McNamara, Thomas P. Morris, and John Brown, company C; Sergeants Dooling and Morrison, Corporal Maloney, Privates Giles, Moore, McCardle, Quinn, Woodsman, Weis, and Zinzinhofer, company F.

*8th Infantry.*—Second Lieutenant Henry M. Lazelle; Corporals John O'Donnell and W. Robinson, company B; Sergeant C. Wolpert and Private McKay, company I.

XXI. July 20, 1857. A detachment of twenty-four men, of company G, 2d cavalry, commanded by Second Lieutenant John B. Hood, from Fort Mason, Texas, towards the close of the fourth day of a fatiguing march, came upon a body of fifty Camanche and Lipan Indians, near the head of Devil's river, (San Pedro,) and after a severe hand to hand conflict, forced them to retire with a loss of nine of their number (one a chief) killed and ten to twelve wounded.

Private Thomas Ryan, killed; Second Lieutenant John B. Hood, Privates John Davit, William W. Williams, Thomas E. Tirrel, and John J. Kane, wounded; Private William Barry, missing, supposed to have been mortally wounded.

XXII. July 24, 1857. The mail escort of one sergeant and six privates of the 8th infantry, commanded by Sergeant Schroeder, and a wood party of one sergeant and six privates of the 1st infantry,

commanded by Sergeant Libbey, having been attacked at a place known as the Ripples, about twenty-five miles from Fort Lancaster, on the road from that post to Fort Davis, Texas, by a body of from eighty to one hundred Indians, and Sergeant Schroeder killed; a detachment of forty men from the 1st infantry at Fort Lancaster, under Second Lieutenants A. M. Haskell and John P. Sherburne, joined to a detachment of forty men of the 8th infantry from Fort Davis, the whole under Second Lieutenant Edward L. Hartz, 8th infantry, was sent out against them. The commander placed his men in wagons, with the covers closely drawn, and marched under the guise of a provision train. The ruse was successful, and the party was attacked, about forty-five miles from Fort Lancaster, by a body of mounted Indians, supposed to be Muscalero Apaches, who were driven back with a loss of three of their number killed and wounded. The troops were unhurt. The conduct of the sergeants commanding the mail escort and the wood party is represented as perfectly correct, and it seems to have been gallant and judicious.

XXIII. July 29, 1857. Colonel E. V. Sumner, 1st cavalry, commanding expedition against the Cheyennes, with companies A, B, D, E, G, and H, of his regiment, and companies C, D, and G, 6th infantry, after a march with the former of more than a thousand miles, came upon a body of some three hundred Cheyenne warriors on Solomon's fork of the Kansas, in Kansas Territory, drawn up in battle array to oppose his march.

The Indians were all well mounted and well armed, many of them with rifles and revolvers. The troops advanced steadily upon them, they standing their ground till charged by the cavalry, when they broke in all directions. They were pursued seven miles with a loss of nine killed. Number wounded not known.

Colonel Sumner's loss was: Private Martin Lynch, of company A, and George Cade, company G, 1st cavalry, killed; First Lieutenant James E. B. Stuart, 1st cavalry, severely, though not dangerously, wounded; First Sergeant George C. McEwen, company D, Private Franz Piot, company B, and James M. Cooke, company G, dangerously; First Sergeant Henry B. Robinson, company H, Privates Francis F. Freer, company B, Rollin Taylor, company E, and Thomas Wilson, company D, severely; and Private Alexander Wilkey, company B, slightly wounded.

The troops, on the 31st of July, took the principal town of the Cheyennes, which had been abandoned, containing one hundred and seventy lodges and a large amount of their property.

XXIV. August, 1857. A detachment of the 2d cavalry, from Fort Clarke, Texas, commanded by Captain Charles J. Whiting, with Second Lieutenant James P. Major, same regiment, and Mr. Dunlap, a citizen volunteer, after a fatiguing and exhausting pursuit of five days, during which time they were twice, for thirty-six hours, without water for their horses, overtook a party of thirty or more Indians, supposed to be of the same party who attacked Second Lieutenant Hood. They were charged by the cavalry, cut off from their horses, and driven to take refuge in a wooded ravine, with a loss of



two killed and three wounded. Their horses, thirty-three in number, were captured.

Second Lieutenant James P. Major and Mr. Dunlap are both warmly commended by Captain Whiting.

XXV. September 28, 1857. A detachment of twelve privates from company I, 2d cavalry, commanded by Sergeant Charles M. Patrick, sent out from Fort McIntosh, Texas, after a search and pursuit of seven days, came upon a party of Indians at a place known as Santa Catarina; one Indian killed and five wounded; eleven of their animals captured. Owing to continued rains, the march was a very severe one, yet the detachment, whilst in pursuit, succeeded in making one hundred and sixty miles in two and a half days.

2. The foregoing list comprises but a few of the expeditions undertaken by the army within the period mentioned. Many of them, too, highly creditable alike to commanders and men, and marked, as well by the vigor, resources, and tenacity of purpose, with which they were prosecuted, as by the toils and sufferings with which they were attended. Nevertheless, no special mention of them is made, it being the intention herein to notice only those where actual conflict took place.

This rule, however, must have a marked exception—that of Brevet Major T. W. Sherman, 3d artillery, who, in August, 1857, marched, at short notice, with his battery, from Fort Snelling to the Indian agency at Yellow Medicine, Minnesota Territory, and, by his promptitude, judgment, and firmness, preserved the country from a war with the Mississippi tribes of the Sioux nation. In this connexion, Second Lieutenant William C. Spencer, 2d infantry, is commended for his gallant bearing on the occasion of his demanding, alone, the Indian murderer from the armed warriors of the tribe.

By command of Brevet Lieutenant General Scott.

IRVIN McDOWELL,  
*Assistant Adjutant General.*

## No. 5.

### REPORT OF THE ADJUTANT GENERAL.

ADJUTANT GENERAL'S OFFICE,  
*Washington, November 27, 1857.*

SIR: Agreeably to your instructions, I have the honor to submit the following report:

The authorized strength of the army, as now posted, is 17,984. The actual strength on the 1st of July last was 15,764. The number of enlistments made during the year ending June 30, 1857, was 5,509. The number of persons offering to enlist, but who were refused on account of minority and unfitness for service, was 12,275. The number of casualties in the army by deaths, discharges, and desertions during the year ending June 30, 1857, was 5,729, of which 2,954 were from the last named cause.

The accompanying tables exhibit the general distribution of the army in the several military departments. The 10th infantry has been replaced in Minnesota by four companies of the 2d infantry from the upper Missouri, and two companies of artillery from the seaboard. Two companies of the 7th infantry have been transferred from Fort Smith, Arkansas, to Fort Laramie, on the Oregon route.

It was the intention of the department to relieve the 4th infantry on the Pacific coast by the 6th infantry, and orders were issued early in March last directing the 4th infantry to concentrate at Fort Walla-Walla, Washington Territory, and proceed from that point to Fort Benton, on the upper Missouri, and thence by water, to Fort Leavenworth, Arkansas, constructing the road upon its route provided for by the act of Congress of February 6, 1855. The companies of the 6th infantry then stationed at Forts Kearny and Laramie were ordered to proceed to the Pacific by the route through the South Pass, and the companies of that regiment serving in Kansas to follow the route indicated for the 4th infantry. But after a very careful examination of the subject, it was considered that before the troops would be ready for the march, and the necessary arrangements could be made for the construction of the road, the season would be too far advanced to execute successfully, during the present year, the movements contemplated, and it was with reluctance accordingly deferred.

The state of affairs in the Territory of Utah being such as in the opinion of the government to require the presence of a military force in that quarter, an expedition was organized in June last, consisting of the 2d dragoons, a battery of artillery, and the 5th and 10th regiments of infantry, and ordered to march to, and take up a position at or near Salt Lake City. Brevet Brigadier General W. S. Harney was originally named as the commander of this force, but it was subsequently deemed inadvisable to detach that officer from the special and highly important duties to which he had been assigned in Kansas, and the troops sent to Utah have been placed under the orders of Colonel A. S. Johnson, 2d cavalry. The instructions given the commanding officer of this expedition for his guidance accompany this report, and the statement of Captain S. Van Vliet, of the quartermaster's department, who was detached to Salt Lake City to obtain information as to the practicability of procuring military supplies at that point, is also annexed.

The Cheyenne Indians having committed numerous depredations upon the emigrants and other parties passing over the Oregon route, an expedition has been made into their country during the past summer by a body of troops under the command of Colonel E. V. Sumner, 1st cavalry, composed of a squadron of the 2d dragoons, three squadrons of the 1st cavalry, and three companies of the 6th infantry. On the 29th of July Colonel Sumner came suddenly upon a large body of the Cheyennes, drawn up in battle array; in the conflict which ensued nine Indians are reported killed, and many wounded. On our part two men were killed, and one officer and eight men wounded. Colonel Sumner's reports of this affair are herewith submitted.

A column, consisting of two squadrons of the 1st cavalry and two

companies of the 6th infantry, commanded by Lieutenant Colonel J. E. Johnson, 1st cavalry, has been employed under the act of Congress of July 8, 1856, in the survey and demarcation of the southern boundary of Kansas, and incidentally, in the preservation of the peace of the plains within the limits of its operations. This duty has been performed with great promptitude.

The unsettled state of affairs in Kansas during the past year has made it necessary to concentrate a large body of troops in that Territory for the preservation of the public peace. At the present time two companies of the 2d dragoons, the 1st cavalry, three batteries of light artillery, thirteen companies of foot artillery, and seven companies of the 6th infantry are serving in Kansas, under the immediate orders of Brevet Brigadier General W. S. Harney. Copies of the instructions issued to that officer, and of papers narrating the progress of events in the Territory, are appended.

The Indians in Texas have continued to commit depredations upon the exposed settlements, and upon the persons and property of travelers passing through that State. The scouting parties sent out from time to time from the military posts have, however, in several instances, inflicted summary punishment upon the offenders. Many Indians have been killed, and much stolen property has been recaptured.

In the department of the Pacific no hostilities of a serious nature have been reported. The troops are so posted as to afford adequate protection against our own Indians, but apprehensions are constantly felt by the inhabitants on Puget's Sound on account of the incursions of the British and Russian Indians. These Indians are very warlike in character, and move about the Sound with great rapidity in very large and well managed canoes, and can only be kept in subjection by the employment of an efficient war steamer upon the waters adjacent to their territory. This measure has been strongly recommended by the department commander and the general-in-chief.

Indian disturbances have been of occasional occurrence in the department of New Mexico, although in general of a less formidable aspect than heretofore. A campaign was made during the spring and summer against the Mogollon, Gila, and Coyotero Apaches, located west of the Rio Grande, in the progress of which an action took place on the 27th June, on the Gila river, between a part of the troops under the command of Colonel B. L. E. Bonneville, 3d infantry, and the Coyotero Indians, resulting in the complete discomfiture of the latter. Twenty warriors were left dead on the battle field. The details of this engagement will be found in the accompanying papers.

The exigencies of the service in Kansas and Utah compelled the department to withdraw the 4th artillery and the 5th infantry from Florida, at a time when the operations being prosecuted by these regiments appeared to give good promise of a speedy and successful termination of the campaign against the hostile Seminoles, in which they were engaged. The companies of the 1st artillery remaining in Florida, and the volunteers which, on the transfer of so large a portion of the regular force to other duties, it was found necessary to call into the service of the general government, have been actively em-

ployed during the past season. The hiding places resorted to by the Indians have been penetrated, and hostile parties have, in several instances, been so closely pressed by the troops as to barely escape capture.

Early in March last a small band of outlaws from the Yancton Sioux Indians, under a chief named Ink-pah-du-tah, attacked a settlement near Spirit Lake, Minnesota, destroying the houses and murdering several persons. The scene of these outrages is on the Iowa line, about one hundred miles west of south, direct from Fort Ridgely. Colonel Alexander, 10th infantry, the commanding officer of Fort Ridgely, on being informed of the outbreak, forthwith despatched a company of forty-eight men under Captain Bee, 10th infantry, to render assistance to the settlers, and, if possible, to overtake and chastise the Indians. The annexed extract from Captain Bee's report of April 9 gives a full account of the difficulties of his march through unbeaten snows, which prevented him from cutting off the hostile party, and also of the origin and extent of the depredations committed. It was feared that collisions would occur between parties of whites, who had armed themselves for defence against apprehended attacks, and the bands of friendly Indians who were pursuing their usual avocations of hunting and making sugar near the settlements. Orders were immediately issued from the department to the commanding officers of Forts Ridgely and Snelling to send out detachments to punish the murderers; and, in consequence of reports which were received that the large numbers of Indians assembled at the Sioux agencies for the payment of their annuities were in a state of excitement, threatening serious disturbances, four companies of artillery were hastened from the seaboard to Fort Snelling.

In compliance with instructions from the War Department, caused by apprehensions of Indian hostilities, Brevet Major G. W. Patten, with his company of the 2d infantry, on the 12th September, re-occupied Fort Ripley, on the Crow-Wing river, which post had been abandoned July 8. Major Patten's report, dated October 7, which is annexed, presents an account of the disturbances which led to the desertion of the missions at Leech and Gull lakes.

I am, sir, very respectfully, your obedient servant,

S. COOPER,  
*Adjutant General.*

Hon. JOHN B. FLOYD,  
*Secretary of War.*

## A.—Organization of the regular army

	Major general.	Brigadier general.	Adjutant general.	Assistant adjutant general, (lieutenant colonel.)	Assistant adjutants general, (majors by brevet.)	Assistant adjutants general, (captains by brevet.)	Judge advocate.	Inspectors general.	Quartermaster general.	Assist. quartermasters general.	Dep. quartermasters general.	Quartermasters.	Assistant quartermasters.	Commissary general of subsistence.	Assistant commissary general of subsistence.	Commissaries of subsistence, (majors.)	Commissaries of subsistence, (captains.)	Surgeon general.	Surgeons.	Assistant surgeons.	Paymaster general.	Deputy paymasters general.	Paymasters.
General officers.....	1	3																					
Aid-de-camp to general officers.....																							
Adjutant general's department.....			1	1	4	†8																	
Judge advocate's department.....						†1																	
Inspector general's department.....								2															
Quartermaster's department.....									1	2	2	4	†28		1	1	2	†8					
Subsistence department.....																							
Medical department.....																		1	26	80			
Pay department.....																					1		
Corps of engineers.....																						2	25
Corps of topographical engineers.....																							
Ordnance department.....																							
1st regiment of dragoons.....																							
2d regiment of dragoons.....																							
Aggregate of dragoons.....																							
1st regiment of cavalry.....																							
2d regiment of cavalry.....																							
Aggregate of cavalry.....																							
Regiment of mounted riflemen.....																							
1st regiment of artillery.....																							
2d regiment of artillery.....																							
3d regiment of artillery.....																							
4th regiment of artillery.....																							
Aggregate of artillery.....																							
1st regiment of infantry.....																							
2d regiment of infantry.....																							
3d regiment of infantry.....																							
4th regiment of infantry.....																							
5th regiment of infantry.....																							
6th regiment of infantry.....																							
7th regiment of infantry.....																							
8th regiment of infantry.....																							
9th regiment of infantry.....																							
10th regiment of infantry.....																							
Aggregate of infantry.....																							
Non-commissioned staff, unattached to regiments.....																							
Grand aggregate.....	1	3	1	1	4	†8	†1	2	1	2	2	4	†28	1	1	2	†8	1	26	80	1	2	25

\* The five aids-de-camp being taken from regiments, in the strength of which they are included, are, to avoid counting them twice, excluded from the columns "total commissioned" and "aggregate."

† One of the assistant adjutants general, (captains by brevet,) four of the twenty-eight assistant quartermasters, and one of the eight commissaries of subsistence, (captains,) belonging also to regiments, and being included in their strength, are, to avoid counting them twice, excluded from the columns "total commissioned" and "aggregate" of their respective departments. As the regimental and staff commissions held by these officers are of unequal grade, they are not affected by the provisions of the 7th section of the act of June 18, 1848. The like remark is applicable to the judge advocate of the army, who is also a captain in the ordnance department.

‡ By the act of March 3, 1853, section 9, a lieutenant of engineers, topographical engineers and ordnance, having served "fourteen years continuous service as lieutenant," is entitled to promotion to the rank of captain; but such promotion is not to increase the whole number of officers in either of said corps beyond the number previously fixed by law.

§ Under the 4th section of the act of April 29, 1812, "making further provision for the corps of engineers," one brevet second lieutenant is allowed to every "company." The number authorized is consequently 199. The number attached to the army was 40, on the 1st of July, 1857, since when nine have become entitled to promotion.

|| The adjutants of artillery and infantry, (14,) and all the regimental quartermasters, (19,) being taken from the subalterns, and as such accounted for in their several regiments, are excluded, as regimental staff officers, from the columns "total commissioned" and "aggregate."

¶ By the act of June 17, 1850 "to increase the rank and file of the army," &c., the President is authorized, whenever the exigencies of the service require it, to increase to 74 the number of privates in any company "serving at the several military posts on the western frontier, and at remote and distant stations." In the table





## B.—General return or exhibit of the actual strength of

	Major general.	Brigadier generals.	Adjutant general.	Assistant adjutant general, (lieutenant colonel.)	Assistant adjutants general, (majors by brevet.)	Assistant adjutants general, (captains by brevet.)	Judge advocate.	Inspectors general.	Quartermaster general.	Asst. quartermasters general.
General officers .....	1	3								
Aid-de-camp to general officers .....										
Adjutant general's department .....			1	1	4	5				
Judge advocate's department .....							1			
Inspector general's department .....								2		
Quartermaster's department .....									1	2
Subsistence department .....										
Medical department .....										
Pay department .....										
Corps of engineers .....										
Corps of topographical engineers .....										
Ordnance department .....										
1st regiment of dragoons .....										
2d regiment of dragoons .....										
Aggregate of dragoons .....										
1st regiment of cavalry .....										
2d regiment of cavalry .....										
Aggregate of cavalry .....										
Regiment of mounted riflemen .....										
1st regiment of artillery .....										
2d regiment of artillery .....										
3d regiment of artillery .....										
4th regiment of artillery .....										
Aggregate of artillery .....										
1st regiment of infantry .....										
2d regiment of infantry .....										
3d regiment of infantry .....										
4th regiment of infantry .....										
5th regiment of infantry .....										
6th regiment of infantry .....										
7th regiment of infantry .....										
8th regiment of infantry .....										
9th regiment of infantry .....										
10th regiment of infantry .....										
Aggregate of infantry .....										
Non-commissioned staff unattached to regiments .....										
Military Academy detachment .....										
Cavalry recruiting depot, Carlisle barracks, Pa. ....										
Principal recruiting depot, Fort Columbus, N. Y. ....										
Recruiting depot, Newport barracks, Ky. ....										
Recruits in rendezvous, and en route .....										
Aggregate of detachments, at depots, rendezvous, &c. ....										
Grand aggregate .....	1	3	1	1	4	*8	*1	2	1	2

\* One of the assistant adjutants general, (captains by brevet,) four of the twenty-eight assistant quartermasters included in their strength, are, to avoid counting them twice, excluded from the columns "total commissioned" officers are of unequal grade, they are not affected by the provisions of the 7th section of the act of June 18 department.

*the Army of the United States on the 1st of July, 1857.*

Deputy quartermasters general.	Quartermasters.	Assistant quartermasters.	Commissary general of subsistence.	Assistant commissary general of subsistence.	Commissaries of subsistence, (majors.)	Commissaries of subsistence, (captains.)	Surgeon general.	Surgeons.	Assistant surgeons.	Paymaster general.	Deputy paymasters general.	Paymasters.	Colonels.	Lieutenant colonels.	Majors.	Captains.
2	4	*28	1	1	2	*8	1	26	80	1	2	25	1	2	4	14
													1	1	4	17
													1	1	4	17
													1	1	2	10
													1	1	2	10
													2	2	4	20
													1	1	2	10
													1	1	2	10
													2	2	4	20
													1	1	2	10
													1	1	2	12
													1	1	2	12
													1	1	2	12
													4	4	8	48
													1	1	2	10
													1	1	2	10
													1	1	2	10
													1	1	2	10
													1	1	2	10
													1	1	2	10
													1	1	2	10
													1	1	2	10
													1	1	2	10
													10	10	20	100
2	4	*28	1	1	2	*8	1	26	80	1	2	25	22	23	50	246

ters, and one of the eight commissaries of subsistence, (captains,) belonging also to regiments, and being in- and "aggregate," of their respective departments. As the regimental and staff commissions held by these 1848. The like remark is applicable to the *judge advocate* of the army, who is also a captain in the ordnance



## B.—General return or exhibit of the actual strength

	Aids-de-camp.	Adjutants.	Regimental quartermasters.	First lieutenants.	Second lieutenants.	Brevet second lieutenants.	Military storekeepers.	Sergeant majors.	Quartermaster sergeants.
General officers.....	*5								
Aid-de-camp to general officers.....									
Adjutant general's department.....									
Judge advocate's department.....									
Inspector general's department.....							6		
Quartermaster's department.....									
Subsistence department.....									
Medical department.....									
Pay department.....				12	10	4			
Corps of engineers.....				10	3	3			
Corps of topographical engineers.....				12	1	3	15		
Ordnance department.....									
1st regiment of dragoons.....		1	†1	10	10	2		1	1
2d regiment of dragoons.....		1	†1	10	10	2		1	1
Aggregate of dragoons.....		2	†2	20	20	4		2	2
1st regiment of cavalry.....			†1	11	10	2			1
2d regiment of cavalry.....		1	†1	10	10	3			1
Aggregate of cavalry.....		1	†2	21	20	5			2
Regiment of mounted riflemen.....		1	†1	10	10	2		1	1
1st regiment of artillery.....		†1	†1	24	12	2		1	1
2d regiment of artillery.....		†1	†1	24	12	2		1	1
3d regiment of artillery.....		†1	†1	24	12	2		1	1
4th regiment of artillery.....		†1	†1	24	12	2		1	1
Aggregate of artillery.....		†4	†4	96*	48	8		4	4
1st regiment of infantry.....		†1	†1	10	9	1		1	1
2d regiment of infantry.....		†1	†1	10	10	1		1	1
3d regiment of infantry.....		†1	†1	10	10	1		1	1
4th regiment of infantry.....		†1	†1	10	10	1		1	1
5th regiment of infantry.....		†1	†1	10	10	1		1	1
6th regiment of infantry.....		†1	†1	10	10	2		1	1
7th regiment of infantry.....		†1	†1	10	10	1		1	1
8th regiment of infantry.....		†1	†1	10	10	1		1	1
9th regiment of infantry.....		†1	†1	10	10	1		1	1
10th regiment of infantry.....		†1	†1	10	10	1		1	1
Aggregate of infantry.....		†10	†10	100	99	11		10	10
Non-commissioned staff unattached to regiments.....									
Military Academy detachments.....									
Cavalry recruiting depot, Carlisle barracks, Pa.....									
Principal recruiting depot, Fort Columbus, N. Y.....									
Recruiting depot, Newport barracks, Ky.....									
Recruits in rendezvous, and en route.....									
Aggregate of detachments, at depots, rendezvous, &c.....									
Grand aggregate.....	*5	†18	†19	281	211	40	21	17	19

\* The five aids-de-camp, being taken from regiments in the strength of which they are included, are, to avoid counting them twice, excluded from the columns "total commissioned" and "aggregate."

† The adjutants of artillery and infantry (14) and all the regimental quartermasters, (19,) being taken from the subalterns, and as such accounted for in their several regiments, are excluded as regimental staff officers from the columns "total commissioned" and "aggregate."

‡ The "number of recruits required" are calculated for each regiment according to the stations of the several companies on the 1st of July, 1857, the number of *privates* ranging according to station, as explained in note (Y) to table A, showing the legal organization of the army.

of the Army of the United States—Continued.

Principal or chief musicians.	Chief buglers.	Ordnance sergeants.	Hospital stewards.	Sergeants.	Corporals.	Buglers.	Musicians.	Farriers and blacksmiths.	Artificers.	Privates.	Enlisted men of ordnance.	Total commissioned.	Total enlisted.	Aggregate.	Number of recruits required.
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	4	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13	.....	13	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	2	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	40	.....	40	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11	.....	11	.....
.....	.....	.....	68	.....	.....	.....	.....	.....	.....	.....	.....	107	68	175	.....
.....	.....	.....	.....	7	8	.....	2	.....	35	36	.....	28	.....	28	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	47	88	135	12
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	39	.....	39	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	54	244	298	6
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	244	.....	.....	.....
.....	2	.....	.....	38	34	18	.....	10	.....	459	.....	37	563	600	292
1	.....	.....	.....	38	33	19	.....	7	.....	375	.....	37	475	512	380
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1	2	.....	.....	76	67	37	.....	17	.....	834	.....	74	1,038	1,112	672
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	2	.....	.....	39	37	16	.....	10	.....	684	.....	37	789	826	66
1	1	.....	.....	39	33	20	.....	8	.....	690	.....	38	793	831	61
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1	3	.....	.....	78	70	36	.....	18	.....	1,374	.....	75	1,582	1,657	127
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	2	.....	.....	37	34	16	.....	18	.....	585	.....	37	694	731	171
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	46	47	2	.....	.....	17	701	.....	54	836	890	82
.....	.....	.....	.....	46	44	2	.....	.....	18	573	.....	54	704	758	32
.....	.....	.....	.....	47	44	.....	23	.....	16	628	.....	54	760	814	242
.....	.....	.....	.....	46	44	2	.....	.....	16	763	.....	54	891	945	111
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	185	179	6	82	.....	67	2,664	.....	216	3,191	3,407	467
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2	.....	.....	.....	38	35	.....	19	.....	.....	447	.....	34	543	577	301
2	.....	.....	.....	37	31	.....	17	.....	.....	500	.....	35	589	624	255
2	.....	.....	.....	40	39	.....	15	.....	.....	527	.....	55	619	654	225
.....	.....	.....	.....	35	35	1	19	.....	.....	482	.....	35	574	609	270
2	.....	.....	.....	37	36	.....	11	.....	.....	662	.....	35	750	785	94
1	.....	.....	.....	38	35	.....	18	.....	.....	587	.....	36	681	717	163
1	.....	.....	.....	39	37	.....	17	.....	.....	484	.....	35	580	615	264
2	.....	.....	.....	39	36	.....	15	.....	.....	521	.....	35	615	650	229
2	.....	.....	.....	36	32	20	.....	.....	.....	749	.....	35	841	876	3
1	.....	.....	.....	38	29	17	.....	.....	.....	346	.....	35	435	468	411
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
15	.....	.....	.....	377	339	38	131	.....	.....	5,305	.....	350	6,225	6,575	2,215
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	72	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	72	72	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	5	6	2	1	.....	.....	122	.....	.....	136	136	.....
.....	.....	.....	.....	6	1	.....	1	.....	.....	236	.....	.....	244	244	.....
1	.....	.....	.....	15	13	.....	.....	.....	.....	358	.....	.....	387	387	.....
.....	.....	.....	.....	4	5	.....	2	.....	.....	76	.....	.....	87	87	.....
.....	.....	.....	.....	23	9	.....	2	.....	.....	577	.....	.....	611	611	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1	.....	.....	.....	53	34	2	6	.....	.....	1,369	.....	.....	1,465	1,465	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
18	7	72	68	813	731	135	221	53	102	12,167	244	1,097	14,667	15,764	\$2,205

§ The number of enlisted men necessary to complete the military establishment is obtained by deducting from the whole number of recruits required to fill up all the regiments, the several detachments at the Military Academy, the three depots, (Fort Columbus, Newport barracks, and Carlisle barracks,) and the recruits at rendezvous and in route. The number required for regiments and corps is 3,670; the number at the Military Academy, at depots, and in route, is 1,465; leaving 2,205 as the number of recruits required to fill up the establishment on the 1st of July, 1857.

S. COOPER, *Adjutant General.*

ADJUTANT GENERAL'S OFFICE, Washington, November 28, 1857.

C.—Position and distribution of the troops in the Department of the  
Wool, Headquarters, Troy,

POSTS.	SITUATION.	COMMANDING OFFICERS.	GARRISONS.	
			REGIMENTS.	
				Number of companies.
				Department staff. . .
Fort Brady.....	Sault de Ste. Marie, Mich...	Capt. H. O. Pratt, 2d artillery....	1	2d artillery.....
Fort Mackinac.....	Michilimackinac, Mich. ....	Capt. A. Elzey, 2d artillery.....	1	2d artillery.....
Fort Independence...	Boston harbor, Mass.....	Capt. and Bvt. Maj. L. G. Arnold, 2d artillery.	2	2d artillery.....
Fort Adams.....	Newport, R. I.....	Capt. and Bvt. Lt. Col. J. B. Magruder, 1st artillery.	1	1st artillery.....
Fort Hamilton.....	Narrows, N. Y. harbor.....	Maj. and Bvt. Lt. Col. M. Burke, 2d artillery.	2	2d artillery.....
Fort Lafayette.....	Baltimore harbor, Md.....	Capt. & Bvt. Lt. Col. H. Brooks, 2d artillery.	2	1st and 2d artillery..
Fort McHenry.....			5	2d, 3d, and 4th art'y.
Fort Monroe.....	Old Point Comfort, Va.....	Maj. and Bvt. Col. H. Brown, 2d artillery.	2	1st artillery.....
Fort Moultrie.....	Charleston harbor, S. C.....	Capt. J. Vogdes, 1st artillery....	1	1st artillery.....
Baton Rouge Barracks	Baton Rouge, La.....	Capt. J. B. Ricketts, 1st artillery.	1	1st artillery.....
Aggregate of	the department.....	.....	17	.....

NOTE.—The force in this department having been since increased by two companies of artillery, ordered to reduced from seventeen companies to twelve.

ADJUTANT GENERAL'S OFFICE,  
Washington, November 28, 1857.

*East, commanded by Brigadier and Brevet Major General John E. N. Y., June 30, 1857.*

PRESENT.																								ABSENT.						PRESENT AND ABSENT.						
Brigadier general.	Assistant adjutant general, (major by brevet.)	Assistant adjutant general, (captain by brevet.)	Assistant quartermaster general.	Deputy quartermaster general.	Quartermaster.	Assistant quartermasters.	Assist. com'y gen'l of subsistence, (lieut. col.)	Commissaries of subsistence, (captains.)	Surgeons.	Assistant surgeons.	Deputy paymaster general.	Paymasters.	Colonel.	Lieutenant colonel.	Majors.	Captains.	Aids de-camp.	Adjutant.	Regimental quartermaster.	First lieutenants.	Second lieutenants.	Brevet second lieutenant.	Military storekeeper.	Enlisted men.	Total commissioned.	Aggregate.	General and staff officers.	Field and regimental staff officers.	Captains.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	Commissioned officers.	Enlisted men.	Aggregate.
1	1	1	1	1	1	3	1	2	1	1	1	2	1	1	1	2	2	1	1	1	1	1	2	15	17	17	1	1	1	1	1	1	15	2	17	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	1	..	..	75	3	78	..	..	..	1	1	1	2	4	76	80
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	1	..	..	62	3	65	..	..	..	1	..	1	1	3	63	66
..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	2	..	..	..	1	2	..	..	124	6	130	..	..	..	1	1	1	1	7	124	131
..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	1	..	..	..	50	3	53	..	..	..	2	..	2	3	5	50	55
..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	2	2	..	..	2	2	..	..	112	8	120	..	..	..	2	1	2	2	10	113	123	
..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	3	..	1	1	5	5	..	..	139	9	148	..	2	1	3	1	6	2	9	141	150	
..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	2	2	..	..	270	17	287	..	2	1	3	1	6	7	23	271	294	
..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	2	..	..	..	114	3	117	..	1	4	6	5	11	8	120	128		
..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	1	1	..	..	..	63	4	67	..	..	1	..	1	1	1	5	63	68	
1	1	1	1	1	1	3	1	2	4	3	1	2	1	1	2	15	2	1	1	1	16	16	1	1011	71	1082	..	2	2	14	12	18	30	89	1023	1112

from New Mexico, and diminished by seven, transferred from it to the Department of the West, is thereby

S. COOPER,  
Adjutant General.

*D.—Position and distribution of the troops in the Department of Florida,  
Fort Brooke, Florida,*

POSTS.	SITUATION.	COMMANDING OFFICERS.	GARRISONS.	
			REGIMENTS.	
				Number of companies.
			Department staff.	
Fort Brooke .....	Tampa, Southern Florida.....	Lieut. Col. and Bvt. Col. J. Munroe, 4th artillery.	Headquarters, 4th artillery.	
Fort Meade.....	Peas Creek, Southern Florida...	First Lieut. J. J. Dana, 4th artillery.	1 4th artillery.....	
Fort Kissimmee.....	Kissimmee river, Southern Fla..	Capt. and Bvt. Major T. Williams, 4th artillery.	1 4th artillery.....	
Fort Capron .....	Indian river, Southern Florida..	First Lieut. and Bvt. Capt. T. Seymour, 1st artillery.	1 1st artillery.....	
In camp near Fort Pierce.	Indian river, Southern Florida..	Capt G. W. Getty, 4th artillery..	1 4th artillery.....	
In camp at Fort Center.	Fish-eating Creek, Southern Fla.	Capt. and Bvt. Major J. C. Pemberton, 4th artillery.	1 4th artillery.....	
Fort Jupiter .....	Jupiter river, Southern Florida..	Capt. J. Roberts, 4th artillery.	1 4th artillery.....	
Fort Drum.....	About 20 miles north of Lake Okeechobee, Southern Fla.	First Lieut. S. H. Wedg, 4th artillery.	.....	
Fort Deynaud.....	Caloosahatchee river, 28 miles above Fort Myers, Southern Florida.	Capt. J. A. Brown, 4th artillery.	1 4th artillery.....	
Fort Myers .....	Caloosahatchee river, 15 miles above its mouth, Southern Florida.	Major W. W. Morris, 4th artillery.	3 4th artillery.....	
Fort Dulany.....	Charlotte Harbor, Southern Florida.	Capt. J. P. McCown, 4th artillery.	1 4th artillery.....	
Fort Dallas .....	Mouth of Miami river, Southern Florida.	Major and Bvt. Col. J. Dimick, 1st artillery.	2 1st artillery.....	
Key West Barracks.	Key West island, Florida.....	Capt. and Bvt. Lieut. Col. J. H. Winder, 1st artillery.	1 1st artillery.....	
Aggregate of the department.....			14	.....

The regular force in this department has been since reduced to four companies of artillery, by transfer of the ADJUTANT GENERAL'S OFFICE, Washington, November 23, 1857.



E.—Position and distribution of the troops in the department of the Smith.—Headquarters St. Louis,

POSTS.	SITUATION.	COMMANDING OFFICERS.	GARRISONS.	
			REGIMENTS.	Number of companies.
			Department staff...	
For Ripley.....	Upper Mississippi, 6 miles south of the mouth of Crow Wing river, Minnesota.	First Lieut. H. B. Kelly, 10th infantry.	10th infantry.....	1
Fort Snelling.....	Upper Mississippi, near St. Paul's, Minnesota.	Capt. and Bvt. Major J. G. Martin, A. Q. M.	3d artillery.....	1
Camp at Belle Plain.	Near Fort Snelling, en route for Upper Sioux agency.	Capt. and Bvt. Major T. W. Sherman, 3d artillery.	3d artillery.....	1
Fort Ridgely.....	Minnesota river, 90 miles from Fort Snelling.	Capt. B. E. Bee, 10th infantry.	10th infantry.....	1
En route for Fort Ridgely.	.....	Lieut. Col. J. J. Abercrombie, 2d infantry.	2d infantry.....	4
Fort Randall.....	Missouri river, 65 miles above L'Eau qui Court, Nebraska.	Col. F. Lee, 2d infantry.....	2d infantry.....	6
Fort Laramie.....	At the junction of Laramie river with the north fork of Platte river, Oregon route, Nebraska.	Major and Bvt. Lieut. Col. W. Hoffman, 6th infantry.	2d dragoons and 6th infantry.	3
Fort Kearney.....	On the south bank of Platte river, Oregon route, Nebraska.	First Lieut. E. G. Marshall, 6th infantry.	6th infantry.....	1
Fort Leavenworth..	Missouri river, 20 miles above the mouth of Kansas river, Kansas.	Col. and Bvt. Brig. Gen. W. S. Harney, 2d dragoons.	2d dragoons, 4th art., and 10th infantry.	17
Fort Riley.....	Republican fork of Kansas river, Kansas Territory.	Lieut. Col. G. Andrews, 6th infantry.	6th infantry.....	1
Jefferson Barracks..	Near St. Louis, Missouri.....	Capt. C. C. Sibley, 5th infantry.	5th infantry.....	7
En route for Jefferson Barracks.	On the Mississippi river.....	Lieut. Col. and Bvt. Col. C. A. Waite, 5th infantry.	5th infantry.....	3
Fort Smith.....	At the junction of the Poteoa river with the Arkansas, Ark.	Capt. and Bvt. Major R. C. Gatlin, 7th infantry.	7th infantry.....	2
Fort Arbuckle.....	Wild Horse Creek, west of Arkansas.	Lieut. Col. P. Morrison, 7th infantry.	7th infantry.....	3
En route for Fort Arbuckle.	Camp, 63 miles east of Fort Arbuckle.	Capt. H. Little, 7th infantry..	7th infantry.....	1
Fort Washita.....	False Washita river. 30 miles above its junction with Red river, west of Arkansas.	Major J. Lynde, 7th infantry.	7th infantry.....	1
En route for Fort Washita.	.....	Capt. L. McLaws, 7th infantry.	7th infantry.....	1
Escort to Lt. Biyan's road party.	Eighty miles west of Fort Kearny.	Capt. T. Hendrickson, 6th infantry.	6th infantry.....	2
In the field.....	At the head of the west branch of the Little Verdigris, Kansas.	Lieut. Col. J. E. Johnston, 1st cavalry.	1st cavalry and 6th infantry.	6
Cheyenne expedition	At the head of Horse creek, Nebraska.	Col. E. V. Sumner, 1st cavalry.	1st cavalry and 6th infantry.	5
	On the south fork of the Platte, Nebraska.	.....do.....	1st cavalry.....	4
Recruits en route....	.....	First Lieut. W. G. Gill, 4th artillery.	10th infantry.....	..
Recruits en route....	.....	.....	6th infantry.....	..
Aggregate of the department.....	.....	.....	.....	70

The force reported in this department, though since increased by seven companies from the department of the army for Utah, consisting of eight companies of the 2d dragoons, the field battery of the 4th artillery, and ADJUTANT GENERAL'S OFFICE, Washington, November 28, 1857.



*West, commanded by Brigadier and Brevet Major General Persifor F. Missouri, June 30, 1857.*

PRESENT.																										ABSENT.						PRESENT AND ABSENT.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
Brigadier general.																										Total commissioned.						Aggregate.						General and staff officers.						Field and regimental staff officers.						Captains.						Subalterns.						Enlisted men.						Total commissioned.						Aggregate.						Commissioned officers.						Enlisted men.						Aggregate.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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the east, and ten from that of Florida, has been yet reduced to fifty-six companies, from having had to furnish the 5th, 10th, and two companies of the 6th regiment of infantry, thirty-one companies in all.

S. COOPER, Adjutant General.



F.—*Position and distribution of the troops in the Department of Texas,  
Headquarters, San Antonio,*

POSTS.	SITUATION.	COMMANDING OFFICERS.	GARRISONS.	
			Number of companies.	REGIMENTS.
				Department staff
Fort Belknap .....	Red Fork of Brazos river, Texas..	Capt. and Bvt. Maj. G. R. Paul, 7th infantry.	2	7th infantry . . .
Camp Cooper.....	Clear Fork of Brazos, 41 miles W.S.W. of Ft. Belknap, Texas.	Lt. Col. and Bvt. Col. R. E. Lee, 2d cavalry.	4	2d cavalry and 1st infantry....
Fort Chabourne . . .	Oak Creek, 30 miles above its junction with the Colorado, Texas.	Capt. J. H. King, 1st infantry ..	2	1st infantry....
Camp Colorado .....	6 miles north of Colorado river, on the road from Ft. Mason to Ft. Belknap, Texas.	Capt. and Bvt. Maj. E. Van Dorn, 2d cavalry.	1	2d cavalry .....
Fort McKavett.....	San Saba river, 95 miles from Ft. Chadbourne.	Ft. Lt. S. B. Holabird, 1st infantry	2	1st infantry ....
Fort Lancaster... .	At the junction of Live Oak Creek with the Pecos river, El Paso road, Texas.	Capt. R. S. Granger, 1st infantry	2	1st infantry ....
Fort Davis.....	At the sources of the Limpia, 475 miles N.W. of San Antonio, Tex.	Lt. Col. W. Seawell, 8th infantry	5	8th infantry ....
Fort Mason.....	Llano river, 110 miles W.N.W. of San Antonio, Texas.	Maj. G. H. Thomas, 2d cavalry.	2	2d cavalry.....
Camp Hudson .....	At the second crossing of the San Pedro or Devil's river, El Paso road, 75 miles north of Ft. Clark, Texas.	Ft. Lt. T. Fink, 8th infantry... 1	1	8th infantry....
Camp Verde.....	Near Bandera Pass, 60 miles N.W. of San Antonio.	Capt. J. N. Palmer, 2d cavalry..	1	2d cavalry .....
Camp G. W. F. Wood	Headwaters of Nueces river, 50 miles N.W. of Ft. Inge, Texas.	Ft. Lt. E. D. Phillips, 1st infantry	1	1st infantry ....
Headq'rs 2d cavalry.	San Antonio, Texas.....	Col. A. S. Johnston, 2d cavalry. .	..	2d cavalry. . . .
Fort Clark . . . . .	Head of Las Moras river, 30 miles north of Ft. Duncan.	Capt. J. Oakes, 2d cavalry.....	2	2d cavalry .....
Fort Inge .....	On the Leona river, 45 miles N.E. of Ft. Duncan.	Capt. E. K. Smith, 2d cavalry..	1	2d cavalry.....
Fort Duncan . . . . .	Eagle Pass, Texas .....	Maj. S. Burbank, 1st infantry... 1	1	1st infantry.....
Fort McIntosh.....	Laredo, Texas.....	Capt. A. G. Brackett, 2d cavalry	1	2d cavalry ....
Ringgold Barracks ..	Rio Grande City, Texas.....	Capt. S. Jones, 1st artillery.....	1	1st artillery ...
Fort Brown. ....	Brownsville, Texas.....	Maj. and Bt. Lt. Col. F. Taylor, 1st artillery.	2	1st artillery ....
Aggregate of	the department .....	.....	31	.....

commanded by *Brigadier and Brevet Major General David E. Twiggs,*  
*Texas, June 30, 1857.*

PRESENT.																										ABSENT.				PRESENT AND ABSENT.							
Brigadier general.																										Aggregate.				General and staff officers.				Commissioned officers.			
Assistant adjutant general, (major by brevet.)																										General and regimental staff officers.				Enlisted men.				Aggregate.			
Assistant adjutant general, (captain by brevet.)																										Captains.				Enlisted men.				Aggregate.			
Assistant quartermaster general.																										Subalterns.				Enlisted men.				Aggregate.			
Deputy quartermaster general.																										Total commissioned.				Total commissioned.				Aggregate.			
Quartermaster.																										Aggregate.				Total commissioned.				Aggregate.			
Assistant quartermasters.																										Aggregate.				Total commissioned.				Aggregate.			
Commissary of subsistence, (major.)																										Aggregate.				Total commissioned.				Aggregate.			
Commissary of subsistence, (captain.)																										Aggregate.				Total commissioned.				Aggregate.			
Surgeons.																										Aggregate.				Total commissioned.				Aggregate.			
Assistant surgeons.																										Aggregate.				Total commissioned.				Aggregate.			
Deputy paymaster general.																										Aggregate.				Total commissioned.				Aggregate.			
Paymasters.																										Aggregate.				Total commissioned.				Aggregate.			
Colonel.																										Aggregate.				Total commissioned.				Aggregate.			
Lieutenant colonels.																										Aggregate.				Total commissioned.				Aggregate.			
Majors.																										Aggregate.				Total commissioned.				Aggregate.			
Captains.																										Aggregate.				Total commissioned.				Aggregate.			
Aid-de-camp.																										Aggregate.				Total commissioned.				Aggregate.			
Adjutants.																										Aggregate.				Total commissioned.				Aggregate.			
Regimental quartermasters.																										Aggregate.				Total commissioned.				Aggregate.			
First lieutenants.																										Aggregate.				Total commissioned.				Aggregate.			
Second lieutenants.																										Aggregate.				Total commissioned.				Aggregate.			
Brevet second lieutenant.																										Aggregate.				Total commissioned.				Aggregate.			
Military storekeeper.																										Aggregate.				Total commissioned.				Aggregate.			
Enlisted men.																										Aggregate.				Total commissioned.				Aggregate.			
Total commissioned.																										Aggregate.				Total commissioned.				Aggregate.			
Aggregate.																										Aggregate.				Total commissioned.				Aggregate.			
General and staff officers.																										Aggregate.				Total commissioned.				Aggregate.			
Field and regimental staff officers.																										Aggregate.				Total commissioned.				Aggregate.			
Captains.																										Aggregate.				Total commissioned.				Aggregate.			
Subalterns.																										Aggregate.				Total commissioned.				Aggregate.			
Enlisted men.																										Aggregate.				Total commissioned.				Aggregate.			
Total commissioned.																										Aggregate.				Total commissioned.				Aggregate.			
Aggregate.																										Aggregate.				Total commissioned.				Aggregate.			
Commissioned officers.																										Aggregate.				Total commissioned.				Aggregate.			
Enlisted men.																										Aggregate.				Total commissioned.				Aggregate.			
Aggregate.																										Aggregate.				Total commissioned.				Aggregate.			
1	1	1	1	1	1	3	1	2	13	3	1	2	3	24	1	3	3	15	22	2086	99	2185	2	9	17	16	28	44	127	2102	2229						

S. COOPER,  
*Adjutant General.*

*G.—Position and distribution of the troops in the Department of New Garland, 8th infantry.—Headquarters,*

POSTS.	SITUATION.	COMMANDING OFFICERS.	GARRISONS.	
			REGIMENTS.	
				Number of companies.
			Department staff. ....	
Fort Massachusetts...	On Utah creek, in the Utah country, 85 miles north of Taos, New Mexico.	Capt. A. W. Bowman, 3d infantry.	2 Mounted rifles and 3d infantry.	
Cantonment Burgwin.	Near the Rio Grande, 9 miles north of Taos, N. Mexico.	Capt. N. C. Macrae, 3d infantry.	2 3d infantry.	
Fort Union .....	On the Moro river, 50 miles N.E. of Santa Fé, N. Mexico.	Capt. L. Jones, mounted rifles.	3 Mounted rifles.....	
Fort Defiance .....	In the Navajo country 180 miles east of Santa Fé. Santa Fé, New Mexico.....	Capt. and Bvt. Maj. W. H. Gordon, 3d infantry. 1st Lieut. J. D. Wilkins, 3d infantry.	3 2d artillery and 3d infantry. Headquarters, 3d infantry.	
Fort Marcy.....	Near Santa Fé, New Mexico.	Capt. and Bvt. Major J. T. Sprague, 8th infantry.	1 8th infantry.....	
Albuquerque .....	On the Rio Grande, N. Mexico	Capt. and Bvt. Maj. J. Van Horne, 3d infantry.	2 Mounted rifles and 3d infantry.	
Fort Craig.....	On the Rio Grande, near Valverde, New Mexico.	Capt. and Bvt. Lt. Col. A. Porter, mounted rifles.	2 Mounted rifles and 3d infantry.	
Fort Stanton .....	On the Bonito river, 20 miles east of the White mountain, New Mexico.	Maj. T. H. Holmes, 8th infantry.	3 Mounted rifles, 2d artillery, and 8th infantry.	
Fort Thorn .....	Santa Barbara, on the Rio Grande, New Mexico.	Capt. J. Trevitt, 3d infantry.	2 Mounted rifles and 3d infantry.	
Fort Fillmore.....	On the Rio Grande, near Bransito, 40 miles above El Paso, New Mexico.	Maj. G. Morris, 3d infantry.	3 Mounted rifles and 3d infantry.	
Fort Bliss .....	Near El Paso, Texas .....	Capt. and Bvt. Lt. Col. J. V. D. Reeve, 8th infantry.	3 Mounted rifles and 8th infantry.	
Fort Buchanan .....	Near Tucson, New Mexico...	Maj. E. Steen, 1st dragoons.	4 1st dragoons.....	
Gila Depot .....	On the Gila river, in the Apache country, about 110 miles west of Ft. Thorn, N. Mexico.	Maj. J. S. Simonton, m <sup>nd</sup> rifles.	.. Detachments .....	
Gila Expedition.....	Operating in the Mogollon and Coyotero Apache country, from its base, the Gila depot.	Col. B. L. Bonneville, 3d infantry.	.. Detachments from all the regiments serving in the depart <sup>nt</sup> .	
Aggregate of the	department.....	.....	30 .....	

The force in this department has been since reduced from *thirty* to *twenty-eight* companies, by transfer of the

ADJUTANT GENERAL'S OFFICE, *Washington, November 28, 1857.*

*Mexico, commanded by Colonel and Brevet Brigadier General John Santa Fé, New Mexico, June 3, 1856.*

PRESENT.																								ABSENT.						PRESENT AND ABSENT.						
Brigadier generals.	Assistant adjutants general, (majors by brevet.)	Assistant adjutants general, (captains by brevet.)	Assistant quartermasters general.	Deputy quartermasters general.	Quartermasters.	Assistant quartermasters.	Commissaries of subsistence, (majors.)	Commissaries of subsistence, (captains.)	Surgeons.	Assistant surgeons.	Deputy paymasters general.	Paymasters.	Colonels.	Lieutenant colonels.	Majors.	Captains.	Aids-de-camp.	Adjutants.	Regimental quartermasters.	First lieutenants.	Second lieutenants.	Brevet second lieutenants.	Military storekeepers.	Enlisted men.	Total commissioned.	Aggregate.	General and staff officers.	Field and regimental staff officers.	Captains.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	Commissioned officers.	Enlisted men.	Aggregate.
..	..	1	..	..	..	2	1	..	..	..	2	1	..	..	..	2	..	..	..	1	..	..	1	...	10	10	..	..	..	..	..	..	..	10	....	10
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	126	2	128	..	..	1	2	3	3	6	5	129	134
..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	111	2	113	..	..	1	1	18	2	20	4	129	133
..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	2	..	..	..	1	..	..	93	5	98	..	..	..	2	4	2	6	7	97	104	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	87	3	90	..	..	..	3	..	3	3	6	87	93	
..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	1	..	..	..	..	19	1	20	..	..	..	..	..	..	..	1	19	20	
..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	..	1	..	..	63	3	66	..	..	1	..	1	1	4	63	67		
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	1	..	..	64	4	68	..	..	1	..	1	1	5	64	69		
..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	1	..	1	1	..	1	..	59	3	62	..	1	2	..	3	3	6	59	65		
..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	1	..	2	1	..	..	..	138	6	144	..	2	1	..	3	3	9	138	147			
..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	1	..	..	..	1	..	..	56	3	59	..	..	1	..	1	1	4	56	60		
..	..	..	..	..	1	..	..	..	1	..	..	..	..	1	2	..	..	..	1	1	..	..	93	7	100	..	1	4	..	1	2	8	94	102		
..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	3	..	..	..	..	1	..	..	67	5	72	..	..	1	1	1	2	6	68	74		
..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	1	..	1	2	..	1	..	114	5	119	..	2	1	..	3	3	8	114	122		
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	1	1	..	1	..	92	4	96	..	..	..	..	..	..	4	92	96		
..	..	..	..	..	..	2	..	..	..	..	2	1	..	4	..	4	1	..	7	11	..	..	654	28	682	..	..	..	..	..	..	..	28	654	682	
..	1	..	..	..	4	1	..	1	9	..	3	3	1	4	24	..	2	1	17	19	..	..	1836	91	1927	..	8	16	27	24	51	115	1863	1978		

two artillery companies to the department of the East.

S. COOPER, *Adjutant General.*

*H.—Position and distribution of the troops in the department of the Pacific 6th infantry.—Headquarters, San*

POSTS.	SITUATION.	COMMANDING OFFICERS.	GARRISONS.	
			Number of companies.	REGIMENTS.
				Department staff...
Fort Bellingham ...	On Bellingham bay, 16 miles south of the mouth of Frazer's river, Wash. Ter.	Capt. G. E. Pickett, 9th inf..	1	9th infantry.....
Escort to Northern Bound'y Commis'n.	Camp near Ft. Bellingham, Wash. Ter.	Capt. D. Woodruff, 9th inf..	1	9th infantry.....
Fort Townsend.....	2½ miles from Port Townsend, on Admiralty inlet, Wash. Ter.	Capt. and Bvt. Major G. O. Haller, 4th infantry.	1	4th infantry.....
Military Post on Muckleshoot Prairie.	Near the junction of White and Green rivers, Wash. Ter.	2d Lieut. D. B. McKibbin, 9th infantry.	1	9th infantry.....
Fort Steilacoom.....	At the southern extremity of Puget's Sound, Wash. Ter.	Capt. M. Maloney, 4th inf..	2	4th infantry.....
Fort Simcoe.....	65 miles north of Fort Dalles, in the Simcoe Valley, Yakima Indian county, Wash. Ter.	Major R. S. Garnett, 9th inf..	3	9th infantry.....
Fort Walla-Walla ..	On Mill creek, 6 miles from its junction with the Walla-Walla river, Wash. Ter.	Major and Bvt. Lt. Col. E. J. Steptoe, 9th infantry.	4	1st dragoons, 3d artillery, 4th and 9th infantry.
En route for Ft. Walla-Walla.	.....	Capt. A. J. Smith, 1st drag'ns.	1	1st dragoons.....
Fort Vancouver. ...	On the Columbia river, 80 miles from its mouth, Wash. Ter.	Lt. Col. T. Morris, 4th inf..	1	4th infantry.....
Fort Cascades.....	Cascades of Columbia river, Wash. Ter.	Capt. and Brevet Maj. F. O. Wyse, 3d artillery.	1	3d artillery.....
Fort Dalles.....	Dalles of Columbia, Oregon Ter.	Col. G. Wright, 9th infantry.	3	9th infantry.....
Fort Yamhill.. ....	On the south fork of Yamhill river, 25 miles southwest of Dayton, Oregon Ter.	2d Lt. P. H. Sheridan, 4th inf..	..	Detachments of 3d artillery and 4th infantry.
Fort Haskins.....	On the Siletz river, 40 miles N.W. of Corvallis, Oregon Ter.	Capt. C. C. Augur, 4th inf....	2	4th infantry.....
Fort Umpqua. ....	On the Umpqua river, near its mouth, Oregon Ter.	Capt. J. Stewart, 3d artillery.	1	3d artillery.....
Fort Jones.....	Yreka, California.....	Capt. H. M. Judah, 4th inf..	1	4th infantry.....
In the field .....	Camp near Yreka, California ..	1st Lt. R. Williams, 1st drag.	1	1st dragoons.....
Camp Hollenbush....	On Pitt river, near the mouth of Fall river, Cal.	Capt. J. W. T. Gardiner, 1st dragoons.	1	1st dragoons.....
Expedition against hostile Indians.	In the Pitt river country, Cal...	1st Lieut. G. Crook, 4th inf...	1	4th infantry.....
Fort Humboldt.....	Humboldt bay, California.....	Major G. J. Rains, 4th inf..	1	4th infantry.....
Nomee Lackee Indian reserve	20 miles S.W. of Tehama, Cal..	1st Lieut. M. P. Morgan, 3d artillery.	..	Detachment of 3d artillery.
Camp Bragg.....	Mendocino Indian reserve.....	1st Lt. H. G. Gibson, 3d art'y..	..	Detachment of 3d art.
Benicia barracks....	Benicia, California.....	Capt. E. O. C. Ord, 3d art'y..	1	3d artillery.....
Presidio San Francisco.	Near San Francisco, California.	Capt. E. D. Keyes, 3d art'y..	1	3d artillery.....
Fort Miller.....	On the San Joaquin river, midway of the San Joaquin valley, California.	1st Lt. L. L. Livingston, 3d artillery.	1	3d artillery.....
Fort Tejon.....	Near the Tejon Pass, at the head of San Joaquin valley, Cal.	Col. T. T. Fauntleroy, 1st dragoons.	1	1st dragoons.....
Mission of San Diego	Near San Diego, California.....	Maj. G. A. H. Blake, 1st drag.	2	1st drag's and 3d art.
Fort Yuma.....	At the junction of the Gila and Colorado rivers, California.	Capt. H. S. Burton, 3d art'y.	3	3d artillery.....
Aggregate of the department .....	.....	.....	35	.....

*fic, commanded by Brevet Brigadier General Newman S. Clarke, colonel Francisco, California, June 30, 1857.*

PRESENT.													ABSENT.					PRESENT AND ABSENT.																		
Brigadier generals.	Asst. adjutants general, (majors by bvt.)	Asst. adjutants general, (captains by bvt.)	Asst. adjutants general.	Deputy quartermasters general.	Quartermasters.	Assistant quartermasters.	Commissaries of subsistence, (majors.)	Commissaries of subsistence, (captains.)	Surgeons.	Assistant surgeons.	Deputy paymasters general.	Paymasters.	Colonels.	Lieutenant colonels.	Majors.	Captains.	Aids-de-camp.	Adjutants.	Regimental quartermasters.	First lieutenants.	Second lieutenants.	Brevet second lieutenants.	Military storekeepers.	Enlisted men.	Total commissioned.	Aggregate.	General and staff officers.	Field and regimental staff officers.	Captains.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	Commissioned officers.	Enlisted men.	Aggregate.
1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	3	13	16							13	3	16	
										1						1				1	1			92	4	96							4	92	96	
									1							1				1	1			82	4	86							4	82	86	
																1				1	1			58	3	61							3	58	61	
																				1	1			84	1	85		1	1	2	2	2	3	84	87	
									1							1			1	2			130	5	135					1	1	5	131	136		
									1					1	3				3	2			244	10	254					3	3	10	247	257		
									1					1	1				4	3			260	10	270		3	2	18	5	23	15	278	293		
																1			1	1			49	3	52							3	49	52		
						1				1	1	1	1	1	1	1	1	1	1	1			55	8	63			1	2	1	3	9	57	66		
													1			1			1				44	3	47							3	44	47		
						1							1			3	1	1	1	2			254	10	264				1	1	1	12	11	265	276	
									1										1				33	2	35							2	33	35		
										1						1			2				77	4	81							4	77	81		
										1						1			1				52	3	55							3	52	55		
										1						1			1	1			64	4	68							4	64	68		
																1			1	1			46	2	48			1		1	3	46	49			
																1			1				49	3	52			1	1	1	2	4	50	54		
																			1	1			50	1	51		1			1	1	2	50	52		
						1									1	1			1	1			61	5	66					1	1	5	62	67		
																			1				20	1	21							1	20	21		
																1	1	1	2				20	1	21							1	20	21		
																1	1	1	1				67	5	72		1		1	2	2	7	67	74		
																1			1				79	4	83				2		2	4	81	85		
																			1	1			63	3	66		1			1	1	4	63	67		
										1									1	1			57	6	63			1	1	3	2	5	8	60	68	
										1						1	1		2	2			108	7	115		1	1	6	2	8	9	114	123		
										1						1			2	3			181	7	188			2	1	3	3	10	181	191		
1	1	1	1	3	1	2	18	4	3	2	4	23	4	23	4	23	4	23	4	23	4	23	4	2382	132	2514	11	11	10	48	22	70	154	2430	2548	

## I.

ADJUTANT GENERAL'S OFFICE,  
Washington, November 28, 1857.

*Statement showing the whole number of recruits enlisted in the army  
from the 1st of July, 1856, to the 30th of June, 1857.*

## I.—GENERAL RECRUITING SERVICE.

Major Albemarle Cady, 6th infantry, general superintendent.

Boston, Mass.....	294
New Haven, Conn.....	20
New York, N. Y.....	649
Albany, N. Y.....	83
Rochester, N. Y.....	46
Buffalo, N. Y.....	172
Trenton, N. J.....	12
Philadelphia, Pa.....	633
Pittsburg, Pa.....	121
Harrisburg, Pa.....	16
Baltimore, Md.....	126
Newport, Ky.....	147
Louisville, Ky.....	59
Columbus, Ohio.....	46
Detroit, Mich.....	91
Chicago, Ill.....	162
Warrington, Florida.....	1
Barrancas Barracks, Florida.....	1
Fort Duncan, Texas.....	1
Washington, D. C.....	4

Number of recruits enlisted for the general service..... 2,684

## II.—MOUNTED SERVICE.

Boston, Mass.....	175
New York, N. Y.....	295
Albany, N. Y.....	124
Philadelphia, Pa.....	156
Pittsburg, Pa.....	93
Harrisburg, Pa.....	12
Carlisle, Pa.....	61
Baltimore, Md.....	95
Richmond, Va.....	136

Number of recruits enlisted for mounted service.... 1,147

## III.—REGIMENTAL SERVICE.

1st regiment of dragoons.....	53
2d regiment of dragoons.....	110
1st regiment of cavalry.....	407

2d regiment of cavalry.....	72	
Regiment of mounted riflemen.....	59	
		<hr/>
Total mounted troops.....		701
1st regiment of artillery.....	75	
2d regiment of artillery.....	57	
3d regiment of artillery.....	140	
4th regiment of artillery.....	89	
		<hr/>
Total artillery.....		361
1st regiment of infantry.....	28	
2d regiment of infantry.....	9	
3d regiment of infantry.....	55	
4th regiment of infantry.....	29	
5th regiment of infantry.....	26	
6th regiment of infantry.....	231	
7th regiment of infantry.....	63	
8th regiment of infantry.....	18	
9th regiment of infantry.....	2	
10th regiment of infantry.....	16	
		<hr/>
Total infantry.....		477
Corps of sappers and miners.....		12
Detachment at West Point.....		33
		<hr/>
Total number enlisted from the 1st July, 1856, to the 30th June, 1857.....		<u>5,420</u>

IV.—RECAPITULATION.

For the general service.....	2,684	
For mounted service.....	1,147	
By regiments.—Dragoons, cavalry, and mounted riflemen .....	701	
Artillery .....	361	
Infantry.....	477	
Sappers and miners and detachment at West Point.....	50	
		<hr/>
		<u>5,420</u>

V.—AMOUNT OF RECRUITING FUNDS.

Amount of recruiting funds in the hands of officers of the army, June 30, 1856.....	\$30,817 02
Amount of recruiting funds advanced to recruiting offi- cers from the 1st July, 1856, to 30th June, 1857.....	96,828 31
	<hr/>
	127,645 33



Brought forward.....	\$127,645 33
Amount of funds accounted for from July 1, 1856, to 30th June, 1857 .....	92,361 72
Balance in the hands of recruiting officers June 30, 1857	<u>35,283 61</u>

Respectfully submitted.

S. COOPER,  
*Adjutant General.*

Hon. JOHN B. FLOYD,  
*Secretary of War, Washington, D. C.*

ADJUTANT GENERAL'S OFFICE,  
*Washington, November 28, 1857.*

SIR: I have the honor to submit, in compliance with your instructions, the following statement, showing the estimated difference of expense between the employment and maintenance of regular troops and of volunteers, embracing a period of about twenty-two years last past. This statement is made from the data furnished in the report of the paymaster general, dated March 6, 1838, (copy herewith,) as well as from such additional data as the records of this office have supplied.

First. Of the number of volunteers musterred into the service of the United States during the war with Mexico, which was as follows :

	Foot.	Cavalry and artillery.
For 3 months.....	95	1,295
For 6 " .....	7,706	3,505
For 12 " .....	19,031	8,032
For the war.....	28,412	5,184
Total .....	<u>55,244</u>	<u>18,016</u>

Of these foot volunteers, we may disregard the 95 three months' men. Of the six months' men, we find 1,103 to have died, been discharged, &c., before the date of muster out, all of whom had served some time, however; many of them four and five months; so that the government had already incurred, in their case, the principal part of the expense which they were likely to occasion it. In a calculation of that expense, therefore, we shall clearly be within bounds by throwing off 706; which leaves for the number of six months' men, 7,000. Throwing off, in the same way, from the number of twelve months' men, 3,031, we shall have left 16,000. Now, the expense of raising and keeping these 16,000 men during twelve months will be nearly equivalent to that of keeping 31,000 men during six months; we will set them down, accordingly, 31,000. Throwing off, in the same way, 5,412 from the number of war men, we then have left 23,000; and as their length of service varied from seven and eight to twenty and twenty-four months, but averaging, on the whole,

considerably over twelve months, we may count their cost as about the same with that of 45,000 six months' men. Adding up these three numbers, we shall have 83,000; and dividing this by 65, or the aggregate of a company of 50 privates, we will get 1,277 companies; which, multiplied by \$2,625, or the difference between the cost of a regular infantry company and one of foot volunteers, for six months, according to the computation of the paymaster general, in 1838, (see House Document 271, 2d session, 25th Congress, table A,) we shall have \$3,352,125 for the minimum amount expended upon these volunteers over what the same number of regular troops would have cost during the same time. Going through the same calculations with the mounted volunteers enumerated above, observing only that the difference of cost between mounted companies of volunteers and regular troops for six months is greater, amounting to \$9,002, we shall get, in the same way, \$3,744,832; which, added to the previous amount, leaves \$7,096,957 as the clear amount which must have been saved during the Mexican war by the use of regular troops instead of volunteers; and, by making a fair allowance for the unnecessarily large mounted force of volunteers called out, this amount will even go up to \$9,021,733. And should we further consider the comparative loss and destruction of military stores and public property by the two forces, referred to in the report of the paymaster general, we may safely assume that not much short of twenty millions might have been saved in the course of the Mexican war by the employment of regular troops in lieu of volunteers; and this is, undoubtedly, an under estimate.

If we go back, now, beyond the Mexican war, as far as the year 1835, we shall find that, in the intervening time, not less than 50,243 volunteers were mustered into the service of the United States for periods varying from one to twelve, but usually of three or six months; of whom much more than half, very nearly two-thirds, indeed, are found to have been mounted. We will, however, consider only one-half of them as mounted; but one-half of these, again, we will regard as having been unnecessarily so, and shall, therefore, compare their relative cost with that of regular infantry; so that the comparison will thus be of three-fourths of the whole number with regular infantry, and of one-fourth only with regular cavalry. How far we shall be under estimating in so doing will appear from a single illustration; for, of the above number of volunteers, we find that 15,112 were furnished by the State of Florida alone for service against the Seminole Indians, and of these 15,112, 12,774 were mounted.

We shall only treat them, too, as *three months'* volunteers; and then, by going through the same series of calculations, we shall obtain \$4,550,864 as the clear amount of saving which would have resulted from the employment, in their stead, of the same number of regular troops.

Since the Mexican war, there have been in the service of the United States 7,382 volunteers, of whom all but 472 have been mounted, and the greater part of whom served six months. They were wholly furnished from the States of Florida and Texas and the Territory of New

Mexico, with the exception only, of two or three companies furnished by Kansas, and about as many more from Oregon. The Rogue river volunteers, in Oregon, of the year 1853, are not included in this number; nor those called out by the governors of Oregon and Washington Territories during the latter part of 1855 and early part of 1856, for the reason that there are no rolls of them in this office. Nor are any others included whose services are not known to have been recognized and accepted by the federal government.

The excess of cost of these 7,382 volunteers over that of the same number of regulars, is found then to be \$1,373,878; which, added to the preceding amounts, obtained for the Mexican war, and the period of ten years anterior to it, gives us a whole of \$14,946,475 for the last twenty-two years; an amount which, as we have already stated, is but the difference clearly ascertained from positive data, and by a sure process of calculation, but falling, in reality, below the true amount, of which it is but a fraction.

With regard to the Rogue river volunteers of the year 1853, however, it is at least known that \$166,770 have already been paid out on their account, and that their claims are not yet wholly satisfied.

By act of August 4, 1854, sec. 9, (see Vol. 10, p. 583, U. S. Stat. at Large,) we find, too, that a sum "not to exceed \$924,259 65" was appropriated by Congress to reimburse the State of California for expenses incurred in the suppression of Indian hostilities by that State prior to the 1st of January, 1854; and that, of that sum, all but \$80,000 or \$90,000 has been already expended.

Whilst, with reference to the Oregon and Washington Territory volunteers of 1855-'56, we have the report of the commissioners appointed under the 11th section of the act of August 18, 1856, which shows that of the number of 6,422 borne upon their rolls, not more than about 3,500 were ever, at any one period, in actual service; and which, at the same time, estimates the grand total of expenses incurred by the two Territories on their account (for which reimbursement is claimed by the federal government) at \$5,931,424 78. An amount which, even at the present increased rates of pay, clothing, subsistence, &c., would have kept the same number of regular cavalry (3,500) in service over three years, and the same number of regular infantry in service for nearly seven years and a half; whilst we know that the volunteers on whom this sum was expended, were, none of them, in service a year, and many of them, probably, not more than a few months.

Admitting, then, that, during the last twenty years, there would have resulted, from the employment of the same number of regular troops as of volunteers, a saving of no more than thirty millions of dollars, it may be easily shown that there could have been employed with this amount for that period of time, at the average cost of pay, subsistence, clothing, forage, &c., during the same, the number of 3,000 cavalry, or of 6,700 infantry; and to this extent might the regular army, therefore, have been increased for the last twenty years.

It is, however, due to the importance of the subject to say, that we, no doubt, considerably understate this amount in setting it down at no more than 30,000,000. For, even whilst making the most liberal

allowances in the preceding calculations, and whilst taking into account only those elements of differences which were of certain ascertainment, we have yet brought up the amount to nearly twenty millions. To consider, therefore, this partial amount as swelled to only ten millions more, (and that whilst including everything,) is to fall far short of the estimate of Mr. Secretary Poinsett; who, in his report of March 21, 1838, in reply to a call of the House of Representatives, stated the relative difference of expense of the two descriptions of force as *four to one*, independently of those elements of difference which we have disregarded.

I am, sir, with great respect, your obedient servant,

S. COOPER,  
*Adjutant General.*

Hon. JOHN B. FLOYD,  
*Secretary of War.*

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DEPARTMENT OF WAR, *March 21, 1838.*

SIR: I have the honor to transmit herewith reports and statements prepared by the adjutant general and the paymaster general of the army, in reply to the resolution of the House of Representatives of the 19th ultimo, respecting the number of volunteers and militia engaged in the service of the United States within the last six years, and the relative cost of their employment and that of the troops of the regular army.

These statements are as accurate as the data in possession of the department will permit. The precise number of militia and volunteers employed, and the exact proportion of mounted men to infantry, cannot be ascertained with perfect correctness. It is believed, however, that the former exceed the number estimated by the adjutant general, and that rather more than three-fourths of them were mounted. The difference of expense between the employment of this description of troops and regulars is at least as four to one, independently of the wastage attending their ignorance of every administrative branch of the service, the enormous expense of marching them to and from distant points for short periods of service, and the great increase that will be made to the pension list under the provisions of the act of the 19th of March, 1836.

Very respectfully, your most obedient servant,

J. R. POINSETT.

Hon. JAMES K. POLK,  
*Speaker of the House of Representatives.*

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PAYMASTER GENERAL'S OFFICE, *March 6, 1838.*

SIR: In compliance with your instructions, I have the honor to submit the accompanying statements, in answer to the third paragraph of the resolution of the House of Representatives of the 19th ultimo, which is as follows:

“3d. The difference in the expense, if any there has been, between the employment of such volunteers, militia, and mounted men, and the troops of the regular army; and, generally, the estimated difference of expense between the employment and maintenance of regular troops and militia, volunteers, or mounted men.”

In preparing this statement, I have used such data as this office furnishes, together with the estimate of the acting quartermaster general, of the cost of forage when furnished in kind, the annual expense of mounting and keeping a regular dragoon soldier mounted, and the proportion of horses taken into service by mounted volunteers, and lost under circumstances that entitle their owners to indemnity. The amount of the indemnity is taken from the Third Auditor's report to you of the 25th of October last, from which it appears that the average value of the horses and equipments, as awarded by him, was \$162 25.

The subsistence of troops forms an important item of expense; but as it is the same for each force, and would not vary the comparison, I have not noticed it.

The calculations are made for a company of fifty privates, fully officered, of each description of troops. The relative expense of any organization above a company will be very near the same.

As irregular troops may be discharged at any period short of the time they engage to serve, and as their monthly expenses vary, the mean of one, three, and six months is considered the true standard of comparison, and the calculations are made accordingly.

It will be seen in the abstract of the calculations (paper A) that the expense of a company of mounted volunteers for six months, under the act of May 23, 1836, is to the expense of a company of United States dragoons as 22,575 to 13,573.34; for three months, as 13,553.69 to 6,786.67; and for one month, as 7,583.58 to 2,262.22. The average expense is as 14,570.76 to 7,540.74.

Mounted volunteers or militia are not wanted to supply the place of dragoons or cavalry; they are armed as infantry or riflemen, and, in battle, act on foot as infantry. Horses for such troops are unnecessary; and so far from facilitating the movements of an army, they retard and embarrass it, especially in unsettled countries, where the forage must be transported in wagons and the roads opened by troops. Notwithstanding this most serious inconvenience, three-fourths of the volunteers that have served in Indian wars have been mounted; and, to form a proper estimate of the relative expense of such troops, the comparison should be made with the United States infantry, to which the proportion is as 14,570.76 to 2,590, or very near six to one.

This enormous disparity in the expenses of the two forces is not owing to the extravagant allowances made to volunteers; for, except in the article of clothing, they are not better paid than regular troops, and altogether insufficiently compensated to reimburse them for the pecuniary sacrifices they make in leaving home and employment, to say nothing of the danger and hardships they encounter. It is caused, principally, by expenses for travelling to and from the place where the services of the volunteers and militia are required; to the hire, maintenance, and indemnity for horses; and to furnishing them a full

supply of clothing as a bounty, without regard to length of service. The statements also show the expense of volunteers serving on foot, and of militia. The term of service of the latter never exceeds three months, unless specially provided for.

There is one comparison that would place the contrast between the expenses of regular and irregular troops in a much stronger light, if I had the data to enable me to state it in figures; and that is, the comparative loss and destruction of military stores and public property by the two forces. The immense importance attached to this subject by European governments, as a principal means of sustaining war, has led to the most rigid economy and the strictest accountability in everything connected with the *materiel* of an army. We have profited by their experience, and it is probable a more perfect system of accountability is nowhere to be found than in our little army; but it requires the study of years to understand, and the exercise of martial law to enforce it. This cannot be expected of irregular troops, that serve at most but a few months. As volunteers are frequently relieved, and their places supplied by others, it requires a large number to keep up a moderate force in the field. This increases in proportion not only the travelling and clothing expenses, but adds greatly to the pension list.

There is another subject which I would respectfully suggest should be considered in connexion with the employment of volunteers; and that is, the great inconvenience to which it subjects that useful class of citizens, the heavy tax imposed on their patriotism, and the loss the country sustains by diverting labor from its proper object, and turning producers into consumers.

Respectfully, your obedient servant,

N. TOWSON,  
*Paymaster General.*

Hon. JOEL R. POINSETT,  
*Secretary of War.*

*Abstract of the expenses of the United States troops, volunteers, and militia.*

Period.	United States troops.		Volunteers.		Militia.	
	Dragoons.	Infantry.	Mounted.	Foot.	Mounted.	Foot.
For six months.....	\$13,573 34	\$4,662 02	\$22,575 01	\$7,287 69	-----	-----
For three months.....	6,786 67	2,331 00	13,553 69	4,978 83	\$12,079 69	\$3,774 53
For one month.....	2,262 22	777 00	7,583 58	3,888 53	5,800 14	2,102 25
Average.....	\$,540 74	2,590 00	14,570 76	5,385 00	8,939 41	2,939 34

NOTE.—The above calculations are for a company of fifty privates of each description of troops fully officered.

PAYMASTER GENERAL'S OFFICE, March 8, 1838.

No. 9.

*Extract from the report of the Surgeon General.*

SURGEON GENERAL'S OFFICE,  
November 9, 1846.

SIR: I have the honor to submit to you a statement of the fiscal transactions of this bureau for the year ending on the 30th of June, and a consolidated report of the sick and wounded of the regular army up to the 30th of September of the present year, together with remarks upon the operations generally of the medical department of the army.

\* \* \* \* \*

In relation to the sickness which has prevailed among the volunteer troops, I have not sufficient data upon which to found a report leading to any useful results.

The surgeons generally of the volunteer corps have made no regular return or other statement of the sick to this office; and no information on the subject, derived from other sources, is sufficiently accurate or explicit to be adopted as the basis of an official report. All that I can say understandingly on the subject is, that whether stationary or on a march, in camp or in the field, the volunteers have been exceedingly sickly.

The Tennessee and Kentucky regiments of cavalry left a great many of their men sick in hospital at Memphis, Tennessee, and again at Little Rock, Arkansas. How many men were left on the road afterwards I do not know; but it is understood that the Kentucky regiment of cavalry continued to be sickly, having, while at Port La Vaca, three hundred on the sick report.

The same proportion of sickness, from all accounts, seems to have prevailed among the volunteers located on the Rio Grande, one-half being from time to time, as is understood, on the sick report.

From the best information which has been received at this office, it is believed that the extent of sickness among the volunteers on the Rio Grande has been fourfold to that among the soldiers of the regular army, with a corresponding excess of mortality in the ranks of the former.

This state of things, it is apprehended, will ever exist with volunteer troops, or undisciplined men employed on distant service and in a foreign clime; more particularly with the volunteer corps gotten up under the impulses of the moment.

Old men forget their age—young men think not of their physical disabilities. Impelled by a feeling of patriotism, a thirst after military fame, or the spirit of adventure, many of them recklessly enter the ranks, and undertake to perform the duties of a soldier, the toils, the privations, nor the self-restraint attendant on which, are they in a frame of mind or of body to endure.

It is not until they have embarked in the enterprise, have journeyed several hundred miles at a great expense to the government, and much to their own discomfort, that they find out there is something



more required to constitute an efficient soldier than patriotism, chivalry, and valor. Then, for the first time, they understand that the labor and exposure, the watching and fasting, the self-denial and self-restraint they have to undergo, and for which neither nature, nor education, nor habit has fitted them, are beyond passive endurance.

In this vexed state of mind they readily take sick, then become melancholy and despondent, with a corresponding aggravation of the disease, so that, should they not sink under the accumulated weight of mental and physical infirmities both, they seldom, after being once stricken down, return to the duties of the field.

By the time they have been restored to their feet again, the battle has been fought and the laurels already borne off; and then, though it has not been their good fortune to attain the object of their high aspirations, (a triumphant conflict with the enemy,) they have exhibited, at the sacrifice of their health, their zeal in their country's cause, and are anxious to return home.

The correctness of these remarks will, it is believed, be admitted by the volunteers themselves, many of whom enrolled their names with the prospect of wearing a commission, but, having failed in their competition for the station of commissioned officer, are obliged to serve in the ranks as a private soldier.

It is proper to state here that one-third and more of all the men who offer to enlist in the regular army are rejected; and it is reasonable to suppose that very many of those who are enrolled for the volunteer service would, if critically examined, be pronounced physically incapacitated for the arduous duties of a soldier. As far as I understand the matter, the government has, under the present state of things, virtually to pay a hundred men, while they realize the services of but fifty.

What with the extraordinary expenses attending the concentration of the individuals at a point, their organization into companies and corps, then their outfit and transportation to the theatre of war, together with the expenses of their return home before the expiration of their term of service, on a sick ticket, or on a certificate of discharge, the volunteers have cost the government one hundred per cent. more per man than the men of the regular army.

But this is not all; the presence of a numerous body of invalids seriously embarrass the service, for, besides consuming the subsistence and other stores required for the efficient men, they must have an additional number of surgeons and men to take care of them, and a guard to protect them, which necessarily lessens the disposable force, the available force for active operations in the field.

From the foregoing statement of facts, it may readily be conceived that measures ought to be taken to prevent the introduction into the volunteer corps, the same as in the regular army, of men who, from disease or original constitutional defectibility, are disqualified to perform the active duties of a soldier.

\* \* \* \* \*

TH. LAWSON,  
*Surgeon General.*

Hon. W. L. MARCY,  
*Secretary of War.*

ADJUTANT GENERAL'S OFFICE,  
*Washington, December 4, 1857.*

SIR: In pursuance of your instructions that I should present you with a brief comparative view of the strength of the army at different periods since the close of our last war with Great Britain, as contrasted with the extent of frontier to be defended by it, and the relative population and resources of the country at the time, I have the honor to submit the following:

By the act of March 3, 1815, fixing the peace establishment, the strength of the army was reduced to 10,000, at which it remained fixed down to the further reduction made in 1821, a period when it reached its lowest figure, and from which soon afterward it slowly began to rise. By the addition of a new regiment in 1823, of another in 1836, and by the further increase in 1838, it successively went up from 6,183, its strength in 1822, to 7,497 in 1837, and to 12,539 in 1839. At the close of the Seminole war, in 1842, it was again reduced to 8,613, but four years after was raised to 12,216 by the addition of the regiment of mounted riflemen, and by an increase in the number of privates. Since then, if we leave out of consideration the Mexican war, the only augmentation to it has been that made by the act of June 17, 1850, authorizing the President to increase the number of privates in any company "serving on the western frontier, or at remote and distant stations," with that more recently made by the act of March 3, 1855, adding four regiments to the establishment. Thus increased, the organized strength of the army varies now from 12,785 to 18,006, though its actual strength falls short of 16,000.

In a letter to the chairman of the military committee of the House, dated December 29, 1819, Mr. Calhoun, then Secretary of War, speaking of our northwestern frontier, says: "it is on that frontier only that we have much to fear from Indian hostilities." The organized strength of the army was then 10,000; the extent of the northwestern frontier, reckoning from St. Louis up to the mouth of the St. Peter's; thence across to Green Bay; thence to Mackinac and up to the Sault Ste. Marie; and from Mackinac down to the present site of Chicago, was about 1,200 miles; and this, from the sparseness of the settlements along or within the line, was thought to be abundantly protected by some four or five posts.

At the present day we have to protect, against savage tribes who are growing every year more hostile, not only the same northwestern frontier, now covered with rich settlements, and, of course, far more vulnerable now, and far more difficult to defend against the sudden and always unforeseen attacks of so wily and active a foe, but a frontier extending thence along the whole western line of our eastern settlements, with another on our western coast stretching from north to south from the 49th down nearly as far as the 32d parallel of north latitude; the Territories of New Mexico and Washington, which are on all sides surrounded by Indian enemies who have, in the former especially, repeatedly carried death and desolation into the very heart of their most populous settlements; the greater part of Texas; much

of the interior of California and Oregon; and finally, the great emigrant routes to California, Oregon, and New Mexico.

The different lines of our military posts, starting from Pembina, where a post would have been established this year had there been troops available for the purpose, down west of Texas to the mouth of the Rio Grande; from San Antonio, in Texas, across the continent to San Diego, in California; from San Diego up to Bellingham bay; from Fort Bliss, Texas, up to Fort Massachusetts; and from the main line of the New Mexican posts across to Fort Defiance, alone, make up a total of over 6,500 miles, which is swelled to over 9,500 by the addition of the three great trails to California, Oregon, and New Mexico, just mentioned; and these distances, it must be remembered, bear a very inconsiderable proportion to the actual extent of frontier exposed.

The population of the United States in the year 1815 may, by taking a mean between the census of 1810 and that of 1820, be set down at 8,438,906; that of the present year probably amounts to at least 26,000,000.

While, then, our population has at least been trebled, and the extent of our frontier settlements to be defended against Indians has increased nearly sevenfold; our revenue being nearly four times as great; the value of our imports being at least doubled, and that of our exports having more than quintupled, the organized strength of the army, meantime, is less than twice as great; and its actual strength falls, usually, 2,000 short even of that to which its organization is limited.

If we compare the various changes which have been made in the organization of the army with the history of the different wars in which the country has been engaged since the year 1815, we will find that there is no economy in keeping the army reduced to a standard of strength so low that it is unable to meet the demands which are made upon its services. It has been stated in official reports before this, that a regiment of troops stationed at Jefferson barracks would have immediately suppressed the first outbreak of the Sac and Fox hostilities in 1832; and that a few regiments ordered at once to Florida would have saved the country from the long and bloody Seminole war of 1835-'42.

Recurring again to the reduction of 1821, we may be allowed to ask what was really gained by it, when not two years had elapsed before it was found necessary again to increase the army, when we see that it has been steadily augmented ever since; and that, to supply for the insufficiency of regular troops in the intervening period between that year and 1846, not less than 55,324 volunteers had to be mustered into the service of the United States.

Looking at the subject in another way, we find that of the 10,000 constituting the strength of the army from 1815 to 1821, nearly three-fourths were usefully employed in garrisoning our maritime fortresses, and, by keeping them and their armaments in good preservation and repair, saved large sums to the government, while not a fourteenth part of our present force, nor more than one-sixth of that formerly so employed, can now be spared for that useful duty. We see, too, that whilst schools of cavalry, artillery, and for rifle practice, are impera-

tively needed to give to our army that thorough training in the several arms of service which is essential to its perfect efficiency in case of our ever being opposed to a civilized foe, it is yet impossible to establish them, for the reason that neither troops nor officers can be spared for the purpose; and thus, while our officers are acquiring admirable lessons of fortitude, endurance, cool presence of mind in danger, and ready resources in the midst of difficulties, and gradually qualifying themselves to dispute the palm of superiority with those of the best light troops of Europe, they are yet, at the same time, slowly unlearning the scientific lessons which the country is at so much pains to inculcate in them at the Military Academy, and from necessity falling somewhat short of what elsewhere constitutes the true standard of the officer of heavy infantry, cavalry, and artillery.

Looking upon the subject in yet another light, we will find that the expenses of an army do not always increase in the same ratio with an increase in its numbers; and that where the latter are insufficient, the cost of transporting large bodies of men over vast distances, from one remote department to another, to repress disturbances, which the mere presence of an efficient force would either have prevented from breaking out, or, at least, have stifled in the beginning, enters largely into the account; and thus it is we find that the annual expense *per man*, including officers, of an average army of 6,000 men, in the years 1809-'10-'11, exceeds that of one of 10,000 men in 1820, from \$50 to as much as \$80; (See House Document 182, 1st session 16th Congress, report of the adjutant and inspector general.)

I have endeavored, in this brief and hasty sketch, strictly to confine myself to the points to which you had directed my attention; but in considering the subject at this day it will not do for us to lose sight of the all-important fact, that the events of the last two or three years are indicative of a spirit of hostility on the part of many powerful tribes who dwell on the great plains which forebodes, at no very distant day, an Indian war of formidable magnitude—one that may, for a long time, check the overland emigration to our Pacific coast, and which can only be averted by vigorous measures, and by an imposing display of our force among them.

In conclusion, allow me to draw your attention to the report made by Mr. Calhoun, when Secretary of War, to the House of Representatives, dated December 12, 1820, which will be found in House Document 197, 2d session, 16th Congress. He has discussed the whole subject upon general principles, and so thoroughly as to leave little to be supplied.

I have the honor to be, sir, very respectfully, your obedient servant,

S. COOPER,  
*Adjutant General.*

Hon. JOHN B. FLOYD,  
*Secretary of War.*

*List of documents accompanying the report of the adjutant general.*

## CHEYENNE EXPEDITION.

- Letter from Colonel E. V. Sumner to the assistant adjutant general at the headquarters of the army, August 9, 1857.
- Letter from Colonel E. V. Sumner to the assistant adjutant general at the headquarters of the army, August 11, 1857.
- Letter from Colonel E. V. Sumner to the assistant adjutant general at the headquarters of the army, September 20, 1857.

## TROOPS IN KANSAS.

- Letter from the adjutant general to General W. S. Harney, May 8, 1857, enclosing—
- No. 1. Letter from the adjutant general to General P. F. Smith, April 1, 1857.
- No. 2. Letter from the adjutant general to the commanding officer at Fort Leavenworth, April 28, 1857.
- No. 3. Letter from the adjutant general to the commanding officer at Fort Leavenworth, October 6, 1855.
- No. 4. Letter from the adjutant general to the commanding officer at Fort Leavenworth, January 30, 1856.
- Letter from General W. S. Harney to the Secretary of War, September 25, 1857, enclosing—
- No. 1. Letter from Governor R. J. Walker to General W. S. Harney, September 21, 1857.
- No. 2. Letter from General W. S. Harney to Governor R. J. Walker, September 22, 1857.
- No. 3. Letter from Captain A. Pleasonton to Lieutenant Colonel J. E. Johnston, September 22, 1857.
- No. 4. Letter from Captain A. Pleasonton to Major J. Sedgwick, September 22, 1857.
- No. 5. Letter from Captain A. Pleasonton to Major J. Sedgwick, September 24, 1857.
- No. 6. Letter from Captain A. Pleasonton to Lieutenant Colonel J. E. Johnston, September 25, 1857.
- No. 7. Proclamation of Governor R. J. Walker, September 10, 1857.
- Letter from General W. S. Harney to the Secretary of War, October 5, 1857, enclosing—
- No. 1. Letter from Governor R. J. Walker to General W. S. Harney, September 26, 1857.
- No. 2. Letter from General W. S. Harney to Governor R. J. Walker, September 27, 1857.
- No. 3. Special orders No. 77, headquarters troops in Kansas, September 26, 1857.
- No. 4. Letter from Captain A. Pleasonton to Major T. W. Sherman, September 26, 1857.
- No. 5. Letter from Governor R. J. Walker to General W. S. Harney, September 28, 1857.

- No. 6. Letter from General W. S. Harney to Governor R. J. Walker, September 28, 1857.
- No. 7. Special orders No. 78, headquarters troops in Kansas, September 28, 1857.
- No. 8. Letter from Captain A. Pleasonton to Lieutenant Colonel H. Brooks, September 28, 1857.
- No. 9. Letter from Governor R. J. Walker to General W. S. Harney, October 3, 1857.
- No. 10. Letter from General W. S. Harney to Governor R. J. Walker, October 3, 1857.
- No. 11. Special orders No. 85, headquarters troops in Kansas, October 3, 1857.
- No. 12. Letter from Captain A. Pleasonton to Major H. J. Hunt, October 3, 1857.
- No. 13. Letter from Captain A. Pleasonton to Captain T. Hendrickson, October 3, 1857.
- No. 14. Letter from Captain A. Pleasonton to Captain E. W. B. Newby, October 3, 1857.
- Letter from General W. S. Harney to the Secretary of War, October 11, 1857, enclosing—
- No. 1. Letter from General W. S. Harney to Governor R. J. Walker, October 9, 1857.
- No. 2. Letter from Governor R. J. Walker to General W. S. Harney, October 10, 1857.

DEPARTMENT OF TEXAS.

- Letter from Lieutenant J. B. Hood to the assistant adjutant general, headquarters, department of Texas, July 28, 1857.
- Letter from Lieutenant J. B. Hood to the post adjutant at Fort Mason, Texas, July 27, 1857.
- Letter from General D. E. Twiggs to the assistant adjutant general at the headquarters of the army, August 5, 1857.

DEPARTMENT OF THE PACIFIC.

- Letter from General N. S. Clarke to the assistant adjutant general at the headquarters of the army, September 14, 1857, enclosing—
- Letter from Major G. O. Haller to the assistant adjutant general at the headquarters, department of the Pacific, August 17, 1857.

DEPARTMENT OF NEW MEXICO.

- Letter from General J. Garland to the assistant adjutant general at the headquarters of the army, June 30, 1857.
- Letter from General J. Garland to the assistant adjutant general at the headquarters of the army, August 1, 1857, enclosing—
- No. 1. Letter from Colonel B. L. E. Bonneville to the assistant adjutant general at the headquarters of the department of New Mexico, July 14, 1857.

- No. 2. Letter from Lieutenant Colonel D. S. Miles to Colonel B. L. E. Bonneville, July 13, 1857.  
 No. 3. Letter from Captain R. S. Ewell to Lieutenant Colonel D. S. Miles, July 13, 1857.

## DEPARTMENT OF FLORIDA.

- Letter from General W. S. Harney to the assistant adjutant general at the headquarters of the army, March 8, 1857.  
 Letter from Colonel G. Loomis to the assistant adjutant general at the headquarters of the army, August 30, 1857, enclosing—  
 No. 1. Letter from Captain J. E. Michler to Colonel G. Loomis, August 28, 1857.  
 No. 2. Letter from Captain W. H. Kendrick to the assistant adjutant general at the headquarters, department of Florida, August 26, 1857.

## INDIAN DISTURBANCES IN MINNESOTA.

- Letter from Captain B. E. Bee to the adjutant of 10th infantry, April 9, 1857.  
 Letter from Colonel L. Thomas to General W. Scott, August 3, 1857.  
 Letter from Colonel L. Thomas to General W. Scott, August 10, 1857.  
 Letter from Captain G. W. Patten to the assistant adjutant general at the headquarters, department of the west, October 7, 1857.

HEADQUARTERS CHEYENNE EXPEDITION,  
*Arkansas river, near the site of Fort Atkinson, August 9, 1857.*

SIR: I have the honor to report that, on the 29th ultimo, while pursuing the Cheyennes down Solomon's fork of the Kansas, we suddenly came upon a large body of them, drawn up in battle array, with their left resting upon the stream and their right covered by a bluff. Their number has been variously estimated from two hundred and fifty to five hundred; I think there were about three hundred. The cavalry were about three miles in advance of the infantry, and the six companies were marching in three columns. I immediately brought them into line, and, without halting, detached the two flank companies at a gallop to turn their flanks, (a movement they were evidently preparing to make against our right,) and we continued to march steadily upon them. The Indians were all mounted and well armed, many of them had rifles and revolvers, and they stood, with remarkable boldness, until we charged and were nearly upon them, when they broke in all directions, and we pursued them seven miles. Their horses were fresh and very fleet, and it was impossible to overtake many of them. There were but nine men killed in the pursuit, but there must have been a great number wounded. I had two men killed, and Lieutenant J. E. B. Stuart, and eight men wounded; but it



is believed they will all recover. All my officers and men behaved admirably. The next day I established a small fort near the battleground, and left my wounded there, in charge of a company of infantry with two pieces of artillery, with orders to proceed to the wagon train, at the lower crossing of the south fork of the Platte, on the 20th instant, if I did not return before that time.

On the 31st ultimo I started again in pursuit, and at fourteen miles I came upon their principal town. The people had all fled; there were one hundred and seventy-one lodges standing, and about as many more that had been hastily taken down, and there was a large amount of Indian property of all kinds of great value to them. I had everything destroyed, and continued the pursuit. I trailed them to within forty miles of this place, when they scattered in all directions. Believing they would reassemble on this river, (for there are no buffalo in their country this summer on which they can subsist,) I have come here hoping to intercept them and to protect this road. I was obliged to send my wagon train back to Laramie from near Fort St. Vrain, and to take pack-mules.

My supplies have been exhausted for some time, except fresh beef, and I have beef only for twenty-four days. I shall send an express to Fort Leavenworth to have supplies pushed out to me as soon as possible, for I do not think these Indians have been sufficiently punished for the barbarous outrages they have recently committed. The battalion of the 6th infantry, under Captain Ketchum, belonging to my command, has had a long and arduous march. It is matter of deep regret to them, as it is to myself, that I could not wait to bring them into the action. As I have no supplies with which I can send these troops back to Laramie, I must take them to Fort Leavenworth; and if they are to return to Laramie this fall, I would respectfully ask for authority to send them up in a light train.

I have the pleasure to report, what I know will give the lieutenant general commanding the army the highest satisfaction, that in these operations not a woman nor a child has been hurt.

I am, sir, very respectfully, your obedient servant,

E. V. SUMNER,

*Colonel 1st Cavalry, Commanding Expedition.*

The ASSISTANT ADJUTANT GENERAL,

*Headquarters of the Army, New York, N. Y.*

HEADQUARTERS CHEYENNE EXPEDITION,

*Arkansas river, one march below Fort Atkinson, Aug. 11, 1857.*

SIR: I have received authentic information from the mail party to-day that the agent for the Cheyennes has gone up to Bent's Fort with the yearly presents for that tribe, and that he has been informed by them that they would not come to receive their presents in the usual way, but that he should never carry the goods out of the country. Under these circumstances, I consider the agent and the public property in his charge in jeopardy. I have therefore decided to proceed at once to Bent's Fort with the elite of my cavalry, in the hope



that I may find the Cheyennes collected in that vicinity, and, by another blow, force them to sue for peace; at all events, this movement will secure this agent and the public property. Another motive is, that by this march up the river I shall more effectually cover this road from Indian depredations this summer.

I have directed Captain Ketchum, with his battalion and a part of the cavalry, to proceed, by easy marches, to Walnut creek, and there await my return.

I am, sir, very respectfully, your obedient servant,

E. V. SUMNER,

*Colonel 1st Cavalry, Commanding.*

ASSISTANT ADJUTANT GENERAL,

*Headquarters of the Army, New York City.*

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HEADQUARTERS FIRST CAVALRY,  
*Fort Leavenworth, K. T., September 20, 1857.*

SIR: I have the honor to submit a report of my operations during the past summer, or rather a brief recapitulation of the reports already forwarded. I detached Major Sedgwick, with four companies of cavalry, from this post on the 18th of May, to move by the Arkansas river, and to meet me on the south fork of the Platte on the 4th of July. I marched, with two companies of cavalry, on the 20th of May for Fort Kearney, where, in compliance with orders, I took up two companies of the 2d dragoons stationed at that post, and moved on towards Fort Laramie. When about eighty miles from the latter post, I received an order to leave the two companies of dragoons at Fort Kearney for General Harney's expedition to Utah. As they were then so near Fort Laramie, instead of sending them back to Fort Kearney, to march over the same ground three times, I took them to Fort Laramie, and left them there; which, I trust, was approved by the general commanding the army. On the 27th of June I moved south from Fort Laramie with two companies of cavalry and three companies of the sixth infantry.

On the 4th of July I reached the south fork of the Platte, and should have formed a junction with Major Sedgwick on that day, but the river was entirely impassable. On the next day I attempted to establish a ferry with the metallic wagon beds, but found them entirely useless, and was obliged to abandon it. The two commands then moved down the river until I found a ford, and I then brought Major Sedgwick's command over to my camp.

It was my intention to establish a larger camp somewhere in that vicinity, and form two columns for the pursuit of the Indians; but hearing they would be in force, and would resist, I determined to abandon my wagons, train, tents, and all other incumbrances, and proceed with my whole command in pursuit of the Indians. The train was sent back to Fort Laramie, with orders to meet me at the lower crossing of the south fork of the Platte in twenty days; but in pursuing the Indians, I was drawn across the country to the Arkansas

river, and we had nothing but fresh beef to subsist upon for some time. I found the trail of the Indians on the 24th of July, and on the 29th came upon them, as already reported; which report narrates the battle, the destruction of the town, and the pursuit through to the Arkansas. On arriving there, I found the agent for the Cheyennes had taken to Bent's Fort the annual presents for that tribe, including arms and ammunition. I knew the government could never intend to send an expedition against a tribe of Indians, and at the same time give them arms and ammunition. I therefore determined to proceed at once to Bent's Fort to prevent the Indians from getting this property, especially as they had threatened that it should not be taken out of the country.

I had also a hope of finding the Indians collected again in that vicinity. I trust my reports in relation to this matter were satisfactory to the commanding general, and that he endorsed them to that effect, for without his approval the measures that I felt bound to take may involve me in difficulty with the Department of the Interior. On my arrival at Walnut creek, I received the order to break up the expedition, and to detach four companies of cavalry and three of infantry for the expedition to Utah. I immediately put the detachment in as good order as possible, by stripping the two companies which were to return to this post, and directed Major Sedgwick to proceed across the country to Fort Kearney, on his route to Utah. We had then marched sixteen hundred miles, and, although this order was entirely unexpected, and the men and horses were much worn down, not a man deserted, when they could easily have made their escape by taking the best of the horses. The conduct of my command throughout the summer has been all I could wish; the officers and men have not only shown bravery in action, but they have shown the higher quality of a manly and cheerful endurance of privations.

Six days after I detached Major Sedgwick, as I was returning to this post with the two remaining companies, I was very happy to receive the countermand of the order for Utah. I arrived at this post on the 16th instant, after marching over eighteen hundred and fifty miles.

I am, sir, very respectfully, your obedient servant,

E. V. SUMNER,

*Colonel 1st Cavalry, Commanding Cheyenne Expedition.*

ASSISTANT ADJUTANT GENERAL,

*Headquarters of the Army, New York City.*

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ADJUTANT GENERAL'S OFFICE,

*Washington, May 8, 1857.*

GENERAL: In transmitting to you "special order" No. 62, of this date, assigning you to duty according to your brevet rank, and to the command of the troops designated for service in the Territory of Kansas, I am directed by the Secretary of War to say that you will

be strictly governed by the instructions of the department, as conveyed in the letters addressed from this office April 1 and April 28, 1857, to the commanding general of the department of the west and the commanding officer at Fort Leavenworth, copies of which are herewith enclosed.

The Secretary especially orders that no portion of the force subject to your authority be used for the removal of intruders from the Indian lands in Kansas, under the instructions of October 6, 1855, and January 30, 1856, copies of which are also enclosed, except after advisement with the governor of the Territory, nor in any way which may conflict with the requisitions that the governor may make upon you.

I am, sir, very respectfully, your obedient servant,

S. COOPER,  
*Adjutant General.*

Brevet Brigadier General W. S. HARNEY,  
*Commanding, &c., &c., Fort Leavenworth, K. T.*

ADJUTANT GENERAL'S OFFICE,  
*Washington, April 1, 1857.*

GENERAL: I am directed by the Secretary of War to convey to you the following instructions for the guidance of the officers of the army serving in the Territory of Kansas:

"If the governor of the Territory, finding the ordinary course of judicial proceedings, and the power vested in the United States marshals and other proper officers, inadequate for the preservation of the public peace and the due execution of the laws, should make requisition upon you to furnish a military force to aid him, as a *posse comitatus*, in the performance of that official duty, you are hereby directed to employ for that purpose the whole or such part of your command as he may require.

"In executing this delicate function of the military power of the United States, the responsibility will be upon the governor of the Territory, and you will implicitly obey his orders. These instructions are given in the hope that the governor will not find it necessary to resort to the military power, and in entire confidence that if so deplorable a necessity should occur, he will discontinue the use of your forces at the earliest practicable moment."

I have the honor to be, sir, very respectfully, your obedient servant,

S. COOPER,  
*Adjutant General.*

Brevet Major General P. F. SMITH, *U. S. Army,*  
*Commanding Department of the West, Baltimore, Md.*

ADJUTANT GENERAL'S OFFICE,  
*Washington, April 28, 1857.*

SIR: I am instructed by the Secretary of War to say that the instructions conveyed in the letter addressed from this office to the com-

manding general of the department of the west, April 1, 1857, placing the troops serving in Kansas at the disposal of the governor of that Territory in certain specified contingences, and with a copy of which you have been furnished, supersede any instructions of a *prior* date from the President or Secretary of War with which they may in any degree conflict.

I am, sir, very respectfully, your obedient servant,

S. COOPER,  
*Adjutant General.*

The COMMANDING OFFICER,  
*Fort Leavenworth, K. T.*

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ADJUTANT GENERAL'S OFFICE,  
*Washington, October 6, 1855.*

SIR: The President of the United States directs that, on proper application therefor, you aid in the removal of intruders from the country in the vicinity of Fort Leavenworth set apart for Indian occupation, according to the terms of the act of 1834, commonly called the Indian intercourse act, a copy of which is herewith transmitted.

I am, sir, very respectfully, your obedient servant,

S. COOPER,  
*Adjutant General.*

COMMANDING OFFICER,  
*Fort Leavenworth, K. T.*

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ADJUTANT GENERAL'S OFFICE,  
*Washington, January 30, 1856.*

SIR: Referring to the letter addressed to you from this office under date of October 6, 1855, in relation to the removal of intruders from the country in the vicinity of Fort Leavenworth set apart for Indian occupation, I have the honor to state that the direction of the President as therein conveyed was not intended to apply to lands ceded by the Indians to the United States for sale, but only to lands actually reserved for their residence.

I am, sir, very respectfully, your obedient servant,

S. COOPER,  
*Adjutant General.*

COMMANDING OFFICER,  
*Fort Leavenworth, K. T.*

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HEADQUARTERS TROOPS SERVING IN KANSAS,  
*Fort Leavenworth, September 25, 1857.*

SIR: I have the honor to enclose for your information a copy of a communication from the governor of this Territory, making a requi-

sition upon me for the forces under the command of Lieutenant Colonel J. E. Johnston and Major J. Sedgwick, 1st cavalry, to act as a "*posse comitatus*" to preserve the public peace, and to aid in the execution of the laws at certain of the election precincts in this Territory during the election to take place on the 6th of October next.

I have also the honor to enclose a copy of my reply to the governor on this subject, and copies of my instructions to Lieutenant Colonel Johnston and Major Sedgwick, in accordance with the requirements of the governor.

I am, sir, very respectfully, your obedient servant,

WM. S. HARNEY,

*Colonel 2d Dragons, Bvt. and Brig. General Commanding.*

Hon. JOHN B. FLOYD,

*Secretary of War, Washington.*

LEAVENWORTH, K. T., *September 21, 1857.*

SIR: Insurrectionary movements, accompanied by a seizure of the polls, being threatened at the general election which will take place in this Territory on the first Monday of October next, it becomes my duty, under my instructions from the President of the United States, to request you to direct Lieutenant Colonel Johnston and Major Sedgwick, respectively, in command of the troops now on their way from the west, to make the following disposition of them:

1st. Lieutenant Colonel Johnston to retain two companies of infantry at Council Grove, in Wise county.

2d. Lieutenant Colonel Johnston to send, immediately, one company of cavalry to each of the following places in this Territory, viz: Emporia, in Breckenridge county; Burlington, in Coffey county; Hyattville, in Anderson county; and to Brownsville, in Shawnee county.

3d. Major Sedgwick to retain two companies of infantry at Marysville, in Marshall county.

4th. Major Sedgwick to send, immediately, one company of cavalry to each of the following points in Kansas, namely: to Richmond, in Nemaha county; to Claytonville, or Hiawatha, in Brown county; to Palermo, in Doniphan county; and to Atchison, in Atchison county.

5th. In case the places named as above should, in any instance, prove to be those in which elections are not holden, then, in lieu thereof, said companies to proceed to the principal points, respectively, in said counties which are election precincts.

6th. Each of these twelve companies to be retained at the places respectively named as above until the day succeeding the election, unless the proper authorities, hereafter referred to, in the execution of their duties, should deem it necessary longer to retain them.

7th. The troops are requested to receive from you directions to act as a *posse comitatus*, in aid of the civil authorities in the due execution of the laws, and for the preservation of the public peace. The United States marshal, or sheriffs, it is presumed, will be at or near the

several county seats, to whom the officer in command will immediately report himself and his force for the objects above specified.

Very respectfully, your obedient servant,

R. J. WALKER,

*Governor of Kansas Territory.*

Brevet Brig. General Wm. S. HARNEY,

*Commanding Troops serving in Kansas.*

HEADQUARTERS TROOPS SERVING IN KANSAS,

*Fort Leavenworth, September 25, 1857.*

Official :

A. PLEASANTON,

*Capt. 2d Dragoons, A. Asst. Adj. Gen'l.*

HEADQUARTERS TROOPS SERVING IN KANSAS,

*Fort Leavenworth, September 22, 1857.*

GOVERNOR: I have the honor to acknowledge the receipt of your communication of the 21st instant, and in reply I desire to inform you I have sent instructions to Lieutenant Colonel Johnston and Major Sedgwick, 1st cavalry, to dispose of their commands in accordance with the arrangements you proposed in your communication, at the same time directing that the forces should be reported, in each case, to the proper civil officer as a "*posse comitatus*" to aid in the execution of the laws and the preservation of the public peace.

I am, governor, very respectfully, your obedient servant,

WILLIAM S. HARNEY,

*Colonel 2d Dragoons and Bvt. Brig. Gen. Commanding.*

His Excellency R. J. WALKER,

*Governor of Kansas Territory, Fort Leavenworth, K. T.*

HEADQUARTERS TROOPS SERVING IN KANSAS,

*Fort Leavenworth, September 25, 1857.*

Official :

A. PLEASANTON,

*Capt. 2d Dragoons, Acting Asst. Adj. Gen.*

HEADQUARTERS TROOPS SERVING IN KANSAS,

*Fort Leavenworth, September 22, 1857.*

COLONEL: The general commanding instructs me to inform you the general election in this Territory will take place on the first Monday of October next, and that the governor of the Territory has deemed it proper and necessary to make requisition upon him for the force under your command, to act as a "*posse comitatus*," under the

authority of the United States marshals, sheriffs, or other proper civil officers, for the purpose of preserving the public peace, and to aid in the due execution of the laws.

You are accordingly directed to make the following disposition of your command, viz :

The two companies of the 6th infantry will be halted at Council Grove, in Wise county.

One company of 1st cavalry will be sent immediately to each of the following named places in the Territory, viz :

Emporia, in Breckenridge county; Burlington, in Coffey county; Hyattsville, in Anderson county; and Brownsville, in Shawnee county.

Should any of the places named above prove to be those in which no elections are to be held, then the said companies will proceed to the principal points, respectively, in said counties, which are election precincts.

Each officer in command of the above named detachments will be instructed by you to report his force as "*posse comitatus*" to the United States marshals, sheriffs, or other proper civil officers, upon his arrival at his place of destination, to execute such instructions as may be given him in that capacity; and he will remain in that position until the day succeeding the election, when he will return to this post, unless the above mentioned civil authorities, in the execution of their duties, should deem it necessary to detain the command for a longer period.

In case any of these commands have not sufficient subsistence to supply them, send your train, or a portion of it, to this post for that purpose.

I am, colonel, very respectfully, your obedient servant,

A. PLEASANTON,

*Capt. 2d Dragoons, Acting Asst. Adj. Gen.*

Lieutenant Colonel J. E. JOHNSTON,

*1st Cavalry, Commanding Troops en route to Fort Leavenworth.*

HEADQUARTERS TROOPS SERVING IN KANSAS,

*Fort Leavenworth, September 25, 1857.*

Official :

A. PLEASANTON,

*Capt. 2d Dragoons, Acting Asst. Adj. Gen.*

HEADQUARTERS TROOPS SERVING IN KANSAS,

*Fort Leavenworth, September 22, 1857.*

MAJOR: The general commanding instructs me to inform you the general election in this Territory will take place on the first Monday of October next, and that the governor of the Territory has deemed it proper and necessary to make requisition upon him for the force

under your command, to act as a "*posse comitatus*," under the authority of the United States marshals, sheriffs, or other proper civil officers, for the purpose of preserving the public peace, and to aid in the due execution of the laws.

You are, accordingly, directed to make the following disposition of the force under your command, viz :

The two companies of the 6th infantry will be halted at Marysville, in Marshall county.

One company of 1st cavalry will be sent immediately to each of the following named places in the Territory, viz :

To Richmond, in Nemaha county; to Claytonville, or Hiawatha, in Brown county; and to Palermo, in Doniphan county; and to Atchison, in Atchison county.

Should any of the places named above prove to be those in which no elections are to be held, then the said companies will proceed to the principal points, respectively, in said counties, which are election precincts.

Each officer in command of the above named detachments will be instructed by you to report his force as a "*posse comitatus*" to the United States marshal, sheriff, or other proper civil officer, upon his arrival at his place of destination, to execute such instructions as may be given him in that capacity; and he will remain in that position until the day succeeding the election, when he will return to this post, unless the above mentioned civil authorities, in the execution of their duties, should deem it necessary to detain the command for a longer period.

In case any of these commands have not sufficient subsistence to supply them, send your train, or a portion of it, to this post for that purpose.

I am, major, very respectfully, your obedient servant,

A. PLEASONTON,

*Capt. 2d Dragoons, Acting Assist. Adjt. General.*

Major J. SEDGWICK, *1st Cavalry.*

HEADQUARTERS TROOPS SERVING IN KANSAS,

*Fort Leavenworth, September 25, 1857.*

Official :

A. PLEASONTON,

*Capt. 2d Dragoons, Acting Assist. Adjt. General.*

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HEADQUARTERS TROOPS SERVING IN KANSAS,

*Fort Leavenworth, September 24, 1857.*

MAJOR: Captain Sturgis, 1st cavalry, will deliver to you a package containing a number of copies of a proclamation from the governor of this Territory, which you are instructed by the general commanding to distribute to the officers of your command, giving directions, at the same time, to the captains of the different companies to present a copy



to each of the judges of election and sheriffs at the respective precincts to which they have been assigned in a former communication.

I am, major, very respectfully, your obedient servant,

A. PLEASONTON,

*Capt. 2d Dragoons, Acting Assist. Adjt. General.*

Major J. SEDGWICK, 1st Cavalry,

*Commanding Troops, Marysville, K. T.*

HEADQUARTERS TROOPS SERVING IN KANSAS,

*Fort Leavenworth, September 25, 1857.*

Official:

A. PLEASONTON,

*Capt. 2d Dragoons, Acting Assist. Adjt. General.*

HEADQUARTERS TROOPS SERVING IN KANSAS,

*Fort Leavenworth, September 25, 1857.*

COLONEL: A number of copies of a proclamation from the governor of this Territory are enclosed to you with this communication, which you are instructed by the general commanding to distribute to the officers of your command, giving directions, at the same time, to the captains of the different companies to present a copy to each of the judges of election and sheriffs at the respective precincts to which they have been assigned in the letter of instructions addressed to you of the 22d instant from these headquarters.

I am, colonel, very respectfully, your obedient servant,

A. PLEASONTON,

*Capt. 2d Dragoons, Acting Assist. Adjt. General.*

Lieut. Col. J. E. JOHNSTON, 1st Cavalry,

*Commanding Troops, &c., Council Grove, K. T.*

HEADQUARTERS TROOPS SERVING IN KANSAS,

*Fort Leavenworth, September 25, 1857.*

Official:

A. PLEASONTON,

*Capt. 2d Dragoons, Acting Assist. Adjt. General.*

TO THE PEOPLE OF KANSAS.

LECOMPTON, K. T., September 10, 1857.

The first Monday in October, 1857, is the day assigned by law for the election, by the people of this Territory, of a delegate to the Congress of the United States, both branches of the territorial legislature, and various county officers. As the governor of Kansas, numerous and urgent calls have been made upon me by various public meetings and committees, by some of the judges of elections, and also by many

citizens, to communicate my views in relation to the qualifications of voters at that election, as also in regard to the legislative apportionment and the establishment of voting precincts.

As to the apportionment, the territorial election law of the 20th of February, 1857, requires it to be made upon the census provided to be taken under the territorial convention act of the 19th of February, 1857. The returns were made under that census, and the apportionment for that convention fixed by the acting governor long before my arrival in this Territory; and, of course, over that matter I have no control whatever. Whilst it was a cause of deep regret to him, as well as to myself, that the census and registry were so incomplete in many counties, and that in fifteen counties, organized as election districts under that law and entitled to vote for delegates to the convention, there was neither census nor registry, and, therefore, that they could not participate in any manner in the choice of delegates on that most important occasion; yet no power to remedy the evil was vested by law either in him or me. The only remedy rests with the convention itself, by submitting, if they deem best, the constitution for ratification or rejection to the vote of the people, under such just and reasonable qualifications as they may prescribe. That they would pursue this course I have never doubted; and although I have no right whatever to interfere in that question, yet, when my individual opinion was asked on this subject by members of the convention and others, I have always indicated a previous residence of three or six months prior to the vote upon the adoption of the constitution as most just and reasonable—a period of three months being prescribed by the convention law itself as the prior residence required in voting for delegates to the convention, and six months being designated by the territorial election law as the previous residence required in voting for members of the territorial legislature. Either of these qualifications, in my opinion, would have embraced the great body of the *bona fide* settlers who might be here *this fall*, inasmuch as the convention would probably not terminate their labors and submit the constitution until some time in November, and inasmuch as three or six months would probably be granted by them as an interval between the date of submission by the convention and the vote upon the constitution. I repeat, however, the opinion always heretofore expressed by me, that this is a matter which belongs exclusively to the convention, over which I have no power, except, in the language of the Kansas-Nebraska act, to “take care that the laws be faithfully executed,” including that organic act itself, and left at liberty, as a citizen, to take such a course as, in my judgment, would be most consonant with the principles of justice, of the Kansas and Nebraska bill, and of the Constitution of the United States in any contingency.

The apportionment of members of both branches of the legislature is based, as I have stated, on the census taken under the convention act of the 19th of February, 1857. My power to make the apportionment expired on the 31st of May last, leaving me but three days exclusive of Sunday, to perform that act after my arrival in this Territory. The territorial laws of 1857 had never been printed. They were then in the course of publication at St. Louis, Missouri

and no copy reached here until the middle of June, long after my power over the subject had expired. The existence of this apportionment law was wholly unknown to the Secretary of state, to the probate judge of this county, or to any other person within my knowledge, and the printed copies, as I have stated, did not reach here until the middle of June. Of course it was impossible for me to perform the duty prescribed in that act, and to guard against the contingency of those laws not reaching here before the first of June, the duty, from and after that date, was devolved by law upon the speaker of the house and president of the council.

That duty was performed by the officers designated by the law, and, I have no doubt, in good faith, although I was never consulted by them on that subject. The law prohibited them from apportioning members to counties not embraced in the census under the convention law, and I know it to be a matter of complaint, by both parties, that the districts are arranged so as to defeat their respective candidates. That the districts were arranged by these gentlemen, as charged by their opponents, with a view to bring voters from the State of Missouri into the adjacent counties of Kansas to control the election, I have the most solemn assurance from the most authentic sources of intelligence in that State, is wholly unfounded in fact. That the census or registry was not made in fifteen counties of Kansas, is owing to the neglect of the local officers of those counties to perform their duties, many of whom have excused themselves on the allegation that no means were provided, and no public money applicable to the expenses of taking the census and making the registry, and that they were unable or unwilling to make the necessary advances themselves. However this may be, I have ever regarded it as a deplorable circumstance that these counties could not participate in the election of delegates to the convention; but I feel confident that no such result was anticipated by the territorial legislature.

Although none of those fifteen counties could vote for delegates to the convention, (the remedy for which lies with the convention itself,) and although no members have been or could be apportioned them for the territorial legislature, yet the speaker of the house and the president of the council, in conformity with the duty prescribed by law, have attached them to other legislative districts, so that they can vote for members of the territorial legislature.

It is certainly a great calamity that these counties are thus deprived of their due weight in the apportionment of members for the territorial legislature, yet they vote for the members in the districts to which they are attached, and the only result is to give too many members of that body to some counties, in the apportionment, according to population, and not an absolute denial of the right of suffrage. This result was not intended by the territorial legislature, and could not be prevented by the officers by whom the apportionment was made. There was no intention on the part of the territorial authorities to disfranchise these counties. But this has arisen from accidental causes, over which I have no authority to exercise any control whatever, and I could give no legal efficacy to any vote that was not legal in itself.

It is hoped that the good citizens of these counties will vote to the extent permitted them by law, looking to an early period for the remedies for all these grievances, and that we shall have no revolutionary outbreak or violence at the election, which would be fraught with incalculable evil, and attended with no possible good.

It will be observed that the apportionment has no effect whatever upon the vote for delegate for Congress or for county officers; in regard to both of which, the counties excluded from the apportionment for the territorial legislature have the same rights and influence, in proportion to their votes, as the people of any of the other counties of Kansas.

In relation to precincts, which I am asked to establish, the act of the territorial legislature of 1855 regulates that subject in the fourth and fifth sections. The power is there given to the county officers to establish the precincts and select the judges of election, but there is a liberal provision in the law to meet any contingency. The fourth and fifth sections of the act are in the following words:

"SEC. 4. Every county that now is, or that may hereafter be established, shall compose an election district, and all elections shall be held at the court-house of such county, where one has been erected. If there be no court-house, then it shall be the duty of the county commissioners to name a house in such county where the election shall be held; and if such commissioners fail to name such house twenty days before the election, it shall be the duty of the sheriff to name such house. In either of the last two cases, the sheriff shall give notice of the place of holding the election by written advertisements, set up in at least six public places in such county, or by advertisement in some newspaper published in such county, at least ten days before the day of the election: *Provided*, That the county commissioners may, from time to time, establish such additional election precincts as may seem to them necessary or proper: *Provided*, further, however, that in no case shall more than one precinct be established in any one municipal township.

"SEC. 5. The county commissioners shall appoint the judges of election, in each county or voting precinct, at least ten days before the election at which they are to act; and if, at the hour for the opening of the polls, such judges are not present, then the voters assembled shall have power to elect others to fill the vacancy or vacancies thus occasioned. Said judges shall, before they enter on the discharge of their duties, take the following oath or affirmation, to be administered by one of their own body, by the sheriff, or by any officer authorized to administer oaths:

"I do swear (or affirm) that I will impartially discharge the duties of judge of the present election according to law and to the best of my ability."

As to the judges of election, then, there can be no difficulty under this law, the power being vested in the people at the several precincts, in case the county officers fail to perform their duty; and if there be no precincts, then the election can only be held at the seat of justice provided by law for each county. It has been suggested that this power is given to me under the convention law of the 19th of Feb-

ruary, 1857, to establish precincts. It is true that very large and comprehensive powers are given to the governor of the Territory by that law, to which I shall have occasion hereafter to refer, and which seem to have escaped public attention; but those powers are especially confined to my action under that law, and confer no authority in that respect in regard to the October election. With me this is a matter of most sincere regret, inasmuch as it is now, and always has been, my most anxious desire to see a full and fair election held in October next, and to contribute to this result to the extent of all the authority devolved upon me by law. By the act of Congress, however, of the 30th of May, 1854, organizing this Territory, and which is still in full force, in that respect, on this subject, it is declared in the 33d section, that "the person having the greatest number of votes shall be declared by the governor to be duly elected, and a certificate thereof shall be given accordingly." As regards the territorial legislature, the certificate is to be given by the secretary of state, who is to count the votes in the presence of the governor; and in relation to the local officers, this duty, in case of contest, is devolved upon the courts.

In view of my duties in connexion with this law, my attention has been called to the qualification of voters under the law. But even here, the prior duty is devolved upon the judges of election; and I might not have felt called upon to give any opinion upon the subject, but for circumstances of a most grave and serious character, to which I shall now refer.

The Territory is threatened with a violent seizure of the polls at the October election, leading, necessarily, to a collision and civil war. This would be a most disastrous circumstance, requiring imperatively the employment of the troops under my control to avert scenes disgraceful alike to this Territory and to our country, and which every good citizen could not but deplore. If, then, under these circumstances, the expression of my opinions could prevent, as in May and June last, the occurrence of such a catastrophe, I regard it as a solemn duty to make that expression, rather than resort to the employment of force, to be followed by scenes of anarchy and bloodshed.

The two questions presented for my consideration are—

First. Can those who were qualified under the organic act to vote at the first election in this Territory vote also in October next, independent of any restrictions imposed by any act of the territorial legislature?

The 22d and 23d sections of the organic law relating to this subject are in the following words:

"SEC. 22. *And be it further enacted*, That the legislative power and authority of said Territory shall be vested in the governor and legislative assembly. The legislative assembly shall consist of the council and house of representatives. The council shall consist of thirteen members, having the qualification of voters, as hereinafter prescribed, whose term of service shall continue two years. The house of representatives shall, at its first session, consist of twenty-six members, possessing the same qualifications as prescribed for members of the council, and whose term of service shall continue one year. The number of representatives may be increased by the legislative assembly,

from time to time, in proportion to the increase of qualified voters: *Provided*, That the whole number shall never exceed thirty-nine. An apportionment shall be made, as nearly equal as practicable, among the several counties or districts, for the election of the council and representatives, giving each section of the Territory representation in the ratio of its qualified voters, as nearly as may be. And the members of the council and house of representatives shall reside in and be inhabitants of the district or county or counties for which they may be elected, respectively. Previous to the election the governor shall cause a census, or enumeration of the inhabitants and qualified voters of the several counties and districts in the Territory, to be taken, by such persons, and in such mode, as the governor shall designate and appoint; and the person so appointed shall receive a reasonable compensation therefor. And the first election shall be held at such time and places, and be conducted in such manner, both as to the persons who shall superintend such election, and the returns thereof, as the governor shall appoint and direct; and he shall at the same time declare the numbers of the council and house of representatives to which each of the counties or districts shall be entitled under this act. The persons having the highest number of legal votes in each of said council districts, for members of the council, shall be declared by the governor to be duly elected to the council; and the persons having the highest number of legal votes for the house of representatives shall be declared by the governor to be duly elected members of said house: *Provided*, That in case two or more persons voted for shall have an equal number of votes, and in case a vacancy shall otherwise occur in either branch of the legislative assembly, the governor shall order a new election; and the persons thus elected to the legislative assembly shall meet at such place and on such day as the governor shall appoint; but thereafter, the time, place, and manner, of holding and conducting all elections by the people, and the apportioning the representation in the several counties or districts, to the council and house of representatives, according to the number of qualified voters, shall be prescribed by law, as well as the day of the commencement of the regular sessions of the legislative assembly: *Provided*, That no session in any one year shall exceed the term of forty days, except the first session, which may continue sixty days.

"SEC. 23. *And be it further enacted*, That every free white male inhabitant above the age of twenty-one years, who shall be an actual resident of said Territory, and shall possess the qualifications hereinafter described, shall be entitled to vote at the first election, and shall be eligible to any office within the said Territory; but the qualification of voters, and of holding office at all subsequent elections, shall be such as shall be prescribed by the legislative assembly: *Provided*, that the right of suffrage, and of holding office, shall be exercised only by citizens of the United States, and those who have declared on oath their intention to become such, and shall have taken an oath to support the Constitution of the United States, and the provisions of this act: *And provided, further*, That no officer, soldier, seaman, or



marine, or other person in the army or navy of the United States, or attached to troops in the service of the United States, shall be allowed to vote or hold office in said Territory, by reason of being on service therein."

It will be perceived that the act of Congress is clear and explicit on this subject. It prescribes the qualifications only of those who "shall be entitled to vote at the *first election*, and shall be eligible to any office within the said Territory; but the qualifications of voters and of holding office *at all subsequent elections* shall be such as *shall be prescribed by the legislative assembly*." The provisos have no application whatever to the subject, inasmuch as they only prohibit the legislature from permitting persons to vote who are neither native nor naturalized citizens, nor have declared on oath their intention to become citizens, and certain officers, soldiers of the army, &c.

Now, then, it is clear, *first*, that as regards all elections but the first, the qualifications are not prescribed by the act of Congress; and, *second*, the qualifications with the restrictions before mentioned, for all subsequent elections, are to be designated exclusively by the territorial legislature.

It is certain, then, that the question now raised as regards the pretended right of persons to vote who possess the requisite qualifications under the act of Congress for voting at the first election, but are excluded by subsequent territorial legislature now in force, has no foundation whatever in law, and such votes would be wholly illegal. Under these circumstances, I trust that no one will attempt to vote who is excluded by the territorial law; and that if such illegal attempt is made, such a clear violation of the act of Congress, and of the laws of this Territory, will be arrested and prevented by the judges of election.

The second question is:

Will voters at the elections in October, who possess all the qualifications provided by the territorial act of the 20th of February, 1857, which is the last act on this subject, be also required to possess other and different qualifications contained in preceding territorial enactments, or is the last law the sole rule of action on this subject? This last act is the general election law, providing for a new and entirely distinct apportionment of members for both branches of the territorial legislature, as also the qualifications of voters at that and all succeeding elections, and is entitled "An act to define and establish the council and representative districts for the second legislative assembly, and for other purposes." The first section designates, by name, the several counties of Kansas which are to constitute the several council districts; the second section designates, by name, the several counties of Kansas which are to constitute the respective representative districts; the third section apportions members among the several representative districts according to the census provided for in the convention law; the fourth section apportions, in the same manner, the members among the several council districts; the fifth and last section is in these words:

"SEC. 5. Every *bona fide* inhabitant of the Territory of Kansas, being a citizen of the United States, over the age of twenty-one years, who shall have resided six months in said Territory before the next general election for members of the council and house of representatives, and no other person whatever, shall be entitled to vote at any general election hereafter to be held in this Territory: *Provided, however,* That nothing in this act contained shall be considered to apply to, or affect in any manner the provisions of an act entitled 'An act to provide for taking the census, and election for delegates to a convention.'

"This act to take effect and be in force from and after its passage."

The language of this section is clear and explicit. It is an act prescribing the qualifications, and all the qualifications, of voters at all future elections. The law is perfect and complete in itself, without any reference whatever to preceding enactments. The language is free from controversy. "*Every bona fide inhabitant,*" &c., "shall be entitled to vote," &c. The words are imperative. It is the language of command from the proper authority, and no one has any right to interpolate restrictions contained in preceding enactments. It is a well settled principle of law, as well as of common sense, that when any subsequent statute proceeds to regulate an entire subject in general and comprehensive language, it is of full force and effect in and of itself, and no restriction or addition can be made to its provisions by reference to any preceding enactments. In such a case there can neither be addition nor subtraction, and the number of qualified voters can neither be augmented by adding to them those who were permitted to vote by preceding laws, nor be lessened by subtracting those who were restricted from the right of suffrage by previous enactments. The words "every citizen," &c., and "no other" shall vote, include all who are described in the act, and exclude all others. Besides, the right of suffrage is the most sacred known to the American people. It is the basis upon which repose all their institutions.

It is a right highly favored in our law; and in all such cases to deprive any one of this right the words must be clear and unambiguous. But in this case there is no ambiguity; and independent of the fact that this act, as regards elections and the qualifications of voters, is an act complete in itself, and prescribing all the provisions applicable to this subject, any interpretation by which a restriction as regards the right of voting, contained in a preceding law, should be superadded to those required in this act, would create a direct and positive repugnance to its clear and explicit language, and therefore would be most clearly repealed by virtue of that universal principle of jurisprudence, that when two statutes contain provisions which are repugnant, repellant, or contradictory, either by way of addition or subtraction, the last statute must prevail.

Now, let us see if there would not be direct repugnancy in this case under the construction contended for by those who assert that although the qualification of a territorial tax is not among the qualification of voters under the act of 1857, yet that it is a qualification under the



act of 1855, and therefore still in force. Let us place them in opposite columns.

*Act of 1857 provides:*

"Every *bona fide* inhabitant of the Territory of Kansas, being a citizen of the United States, over the age of twenty-one years, and who shall have resided six months in said Territory before the next general election for members of the council and house of representatives, and no other person whatsoever, shall be entitled to vote at any general election hereafter to be held in this Territory."

The act of 1857, as now construed, would read as follows: "Every *bona fide* inhabitant of the Territory of Kansas, being a citizen of the United States, over the age of twenty-one years, and who shall have resided six months in said Territory before the next general election for members of the council and house of representatives, and *no other* person whatsoever, shall be entitled to vote at any general election hereafter to be held in this Territory;" *but no such citizen shall be permitted to vote unless he has first paid a territorial tax.*

Is it not clear that the two provisions would be directly repugnant by the addition to the act of 1857 of a proviso and restriction not contained in that act, but in a previous law. The words of the act of 1857 are general. "Every citizen," &c., shall be entitled to vote on a residence of six months. This language gives the right to vote, in clear and positive terms, to every citizen, &c., who has been a resident for the term prescribed by law. "Every citizen" are general and comprehensive terms, and they cannot be restricted by other words not contained in this law. By the 11th section of the act of 1855 no previous residence is required as a qualification for a voter, but the payment of a territorial tax is made a prerequisite. Now, it is clear, that if, when prescribing a previous residence of six months, in using the general and comprehensive language "every citizen," &c., the legislature of 1857, besides that residence for the first time prescribed by law, had intended, in addition, to require the previous payment of a territorial tax, they would have said so; and not having said so, such words can be interpolated neither by judicial nor executive construction. In fact, it is not a case of construction at all, but of using words which the legislature have not used, and of making provisos and restrictions for them which they have not made, and of excluding voters from the polls whom they have not excluded. Besides, this is no new question. It has occurred repeatedly in the several States and Territories of this Union, and, as a principle of universal adoption under such laws, it is well settled, without a single exception to the rule, that where one State constitution, regulating the right of suffrage, prescribes certain qualifications of voters, it is complete in and of itself, and is universally regarded as repugnant to so much of any previous constitution which either adds to, or subtracts from, such qualification. And the same rule prevails in relation to State and territorial laws. This is the great American rule of interpretation on this subject, amounting from long established and universal usage, to the force of law.

If there could have been any possible doubt on this subject, it is removed by the provisions of the territorial convention law, passed on the day preceding that on which was enacted the election law, and referred to and made the basis of many of the provisions of the latter. That convention law prescribes a previous residence of three months, and a registry, as qualification for voters; but is just as silent as the

territorial election law on the subject of a payment of a tax, and yet no one has ever pretended that the pre-payment of any tax constitutes a necessary qualification for a voter for delegate to that convention.

No such payment of a tax was ever exacted, and was rarely, if ever, made. And such a construction as is now contended for, that because there was no direct repeal of the tax qualification, therefore it still existed, would render illegal the election of nearly every member of the constitutional convention, and impair the validity of all their acts. The election law of 1855, imposing the tax qualification, was general.

It applied to *all* subsequent elections, to "every inhabitant" of this Territory, and of the county or district in which he offers to vote, and to all "*elective officers.*" It was as general and comprehensive in its application to *every election* which could take place under any Territorial law as the legislature could make it, and would apply the restriction of the pre-payment of a territorial tax in voting for delegates to the convention, just as much as in voting for members of the territorial legislature in October; upon this alleged principle, that restrictions or qualifications in preceding laws are not repealed by general provisions in a subsequent statute prescribing for subsequent elections the qualifications of voters. The convention law required a three months' previous residence and registry as a qualification of voters, but was silent, like the election law of 1857, as regards the pre-payment of any tax; and if such a pre-payment, by force of preceding enactments, applies as a qualification for a voter for the Territorial legislature in October, then it would just as clearly follow, that inasmuch as the convention act was equally silent as to the payment of a tax, the voters for delegates to that convention, besides the three months' residence and registry, must have paid a tax also. But the truth is, whilst the tax remains, the qualification applies no more to the election in October than it does to the election of the delegates to the convention, because it was dropped in both acts, and because we have no right to insert a most important provision that is thus omitted by the legislature, and because it is a settled rule in interpreting statutes, that if the legislature had intended, in either case, in prescribing the qualifications, and all the qualifications of voters, to superadd one that was inserted in a preceding law, they would have repeated the restriction in the subsequent statute. How easy was it for the legislature, in prescribing the qualification of voters under the convention or election law, if they intended, in addition to the qualifications named in these laws, to require the payment of a tax, to have said so, and not left it to others to interpolate words which they had excluded. They have not said so, and that is enough. On this subject I have never entertained any doubt, and never supposed there could be any question. And I might have declined the expression of any opinion on either of these points, but for the certain knowledge of the fact communicated to me from almost every quarter of the Territory, and from all parties, that these conflicting constructions of the law, if not settled, will certainly produce collision at the polls, and, most probably, a disastrous civil war and revolution. I claim no authority to instruct the judges of election, by virtue of my official power, how they shall decide; but I give my opinion as others have given

theirs, and with the same sincerity, in the hope that it may tend somewhat to prevent the disasters with which we are threatened, growing out of these conflicting opinions, and that it may render unnecessary a resort to the military force, subject to my orders, to preserve the peace of the Territory. That military force, which is now already here, or daily arriving, is amply sufficient to preserve the peace of Kansas; but it is my sincere hope that the mere presence of this force, competent as it is to suppress insurrection or rebellion, and maintain the authority of the law, will render any collision unnecessary.

On the 19th of August last I communicated to the President, through the Secretary of State, my views on this subject, together with copies of the several territorial laws, and asked the aid of the President and his cabinet to sustain me, by the moral force of their opinion, in preventing a collision and civil war in this Territory, by stating, if such should be the fact, their concurrence with me in these views. In reply to this communication, in a despatch from the Secretary of State to me, under date of the 2d of September, 1857, after remarking, most justly, as I always contended, that I could issue no authoritative mandate to the judges of election on this subject, or control their decision, he says:

"The Territory of Kansas is in a peculiar condition. By your statement, and possessing, as you do, the best means of information, your views, in the opinion of the President, are entitled to great weight. It is in a state of incipient rebellion, with an organized military force prepared to resist the authority of the United States.

"It may therefore become necessary to use the troops placed at your disposal, not only to aid as a *posse comitatus* in executing the laws, but also to suppress an insurrection. Surely, under these circumstances, if the expression of an opinion in advance of his action, and, it may be, instead of it, which the President honestly entertains, will have a direct effort in preventing a civil war in Kansas, he cannot be justly censured for attempting, by such an expression of opinion, to avert the calamitous result.

"The danger you anticipate arises, as you observe, from the apprehension of a portion of the citizens of Kansas that they will be excluded from the privilege of voting because they have not paid a territorial tax. Now, the President, as well as every member of his cabinet, concurs in opinion with you, that the payment of such tax is not required as a qualification to vote. He and they entertain not a doubt that the 5th section of the act of February 20, 1857, is complete in itself, and prescribes all the qualifications required of a voter, and among these the payment of a territorial tax is not included. They are also firmly convinced that no person whatever, not possessing these qualifications, notwithstanding they may possess the qualifications prescribed for voters by the organic act of Congress of May 30, 1854, has any just claim to the elective franchise."

It will be observed, then, that in view of the deplorable condition of Kansas for the last three years, and the civil war which has so long raged in this Territory, and the imminent danger of a renewal of that conflict, growing out of conflicting views as to the qualification of voters at the ensuing election, the President and his cabinet

have deemed the occasion sufficiently solemn and important to express their full, unanimous, and entire concurrence in the views as to the qualifications of electors at the October election on those points set forth by me in this address, and previously communicated by me to the Secretary of State.

It is obvious that the territorial government of Kansas must be maintained either by a superior physical force, or, as in all other States and Territories, by the majority of qualified voters at the election.

I never contemplated the use of the military force but in aid of the execution of the laws, to protect the citizens in the exercise of their legal rights, as a *posse comitatus* to arrest offenders, where the civil authority might prove incompetent without such aid, and where the law authorized military power to suppress insurrection or rebellion. Physical force and the bayonet constitute the real power in nearly all monarchies and despotic governments, but here it is the will of the majority of the people, qualified to vote under the Constitution or under the laws, which is to govern; and the sooner all such questions are decided by a full and fair vote of the qualified electors at the polls, the better; and then, and not till then, shall we have peace and repose in Kansas. Unless force is to be substituted for the elective franchise, unless despotic and monarchical principles are making here insensible progress, sooner or later the question must thus be decided; and the sooner the better, not only for the true interests of this Territory, but for the security of the Union and the cause of self-government here and throughout the world.

The eyes of our country and the world are now directed with intense interest to the coming election in Kansas in October next. Whether the people of this Territory are, indeed, capable of self-government; whether the scenes which have disgraced Kansas and our country for the last three years are to be renewed indefinitely; whether violence, injustice, or insurrection, on one or both sides for the moment, and for the moment only, are to decide the question, or whether our political differences are to be settled here, as in all other States and Territories, (under the provisions of our organic law,) by the full, free, and fair exercise of the elective franchise, are the momentous questions to which you must all now soon answer. The test oath is expressly repealed as a qualification for voters by an act of the territorial legislature of the 17th of February, 1857.

The people of Kansas have now, therefore, an opportunity, in conformity with the Constitution of the United States, the organic act of Congress, and the laws of this Territory, to decide, by the elective franchise, the choice of their delegate to Congress, their territorial legislature, and all their county officers.

The troops at my disposal, which are fully competent to the task, will, at the request of citizens of both parties, be stationed at the points where violence has been threatened or anticipated; not for the purpose of overawing the people, or of interfering in any way with the elections, or of influencing them in any respect whatever, but, by their mere presence, guarding the polls against any attempt at insurrection or violence, from the mere knowledge of the fact that it can

and will be suppressed ; but, if necessary, also to protect and secure, by lawful means, all the just rights of the citizen in exercising the elective franchise under the decision of the proper authorities, and to act as a *posse comitatus* for the arrest of offenders. I should have greatly preferred, as expressed in my letter of acceptance of the office of governor of this Territory, never to have been required to call out the troops, even as a precautionary measure. As it is, not a drop of blood has been shed, and insurrection has been suppressed, until it recently reappeared, in a compulsory tax law, by the insurgent government at Lawrence, and in conflagration of dwellings and expulsion of peaceable citizens in its vicinage, after it was known the troops were ordered to Utah, and when it was falsely supposed that they would not be replaced by others. Indeed, if the revolutionary government of Lawrence had not been encountered by the immediate movement of troops there, it is now clear that similar insurrectionary local governments, based on my presumed acquiescence, would have been organized throughout Kansas, in open defiance of the laws of Congress and of this Territory, and rendered a peaceful settlement impossible. It will be remembered that, in open defiance of the laws of Congress and of this Territory, and after the refusal of the so-called Topeka State legislature to grant them a charter, they, nevertheless, organized a city government, clothed with all the usual powers—legislative, executive, and judicial. It will be recollected, also, that after my proclamation of the 15th of July last, and the simultaneous movement of the troops there, as a precautionary measure, to maintain the authority of the government and arrest the spread of this insurrection throughout the Territory, they then professed, through their organs, that what they had called a *government*, and to which they had given all the powers of a government, was a mere *voluntary association* for the removal of nuisances from the streets, &c. But now, when it was erroneously believed by them that the troops would all be removed to Utah and not replaced by others, they have thrown off the mask, and carried out their original insurrectionary purpose, by passing a compulsory tax law, both a poll and property tax, requiring its assessment and collection by the seizure and sale of property, and exacting, by their charter, from executive officers, who are to carry out these acts, an *oath* to perform all these duties, the violation of which oath, if these duties are not performed, would be perjury. At the same time, they seemed to have believed that this precautionary movement of mine, and proclamation, were disapproved by the President of the United States ; whereas, they were both most cordially sustained by him, in the despatch to me from the Secretary of State, of the 25th of July last, as also in the published letter of President Buchanan to Professor Silliman and others, of the 15th of August last. An overwhelming majority of the press and people of the United States have condemned this insurgent movement ; the example has not been adopted by any other locality in Kansas, contrary to the expectation of its authors ; it failed to receive any sanction from the general territorial convention of their own party, of the 26th ult., and now stands without a precedent in our

country, a solitary monument of revolutionary violence and incipient treason.

So soon as the *overt act* now threatened is consummated, this rebellion will be suppressed by the lawful use, if necessary, of all the troops under my control, acting in aid of the civil authorities designated by Congress. It is hoped, however, especially as, I trust, we shall have a fair and peaceful election, when, whichever party shall prevail, all semblance of excuse for this insurgent movement will have ceased, that the majority of the people of Lawrence will abandon their reckless leaders, suppress this insurrection themselves, and relieve our Territory and country from the disgrace of an insurrectionary government, based now only on undisguised revolution, and an open overthrow not merely of the territorial laws, but of the laws, also, of the United States. The honor and character of the country, and my sworn duty as chief magistrate of Kansas, require that this first actual example of organized rebellion, as a government, against the authority of Congress, should be suppressed, as it must be, and the sooner it is done by the people of Lawrence themselves the better, for the sake of their own true interests and reputation. Dangerous and unjustifiable as was the Topeka State movement, it differed widely from the Lawrence insurrection—in this, that the latter not only passed laws, but required, by seizure and sale of property, their compulsory execution, under the requisition of an oath; whereas, the so-called Topeka State government proposed, on the face of their late proceedings, to wait until they received, as they profess to hope, the recognition of Congress. As the troops of the United States now subject to my orders are sufficient to protect the polls and preserve the peace of Kansas, it is hoped that the forces raised professedly for that purpose, without authority of law, will be at once disbanded.

From authentic information communicated to me from many quarters of this Territory, and from many citizens of both parties, that the presence of the troops is essential to preserve the peace of the Territory, to prevent the forcible seizure of the polls, and to suppress insurrection, I feel constrained, although most reluctantly, by a solemn sense of duty, and by a most serious apprehension of the consequences which otherwise would follow, to place the troops at proper points, not for war, but for peace, in accordance with the views and purposes before stated.

In conclusion, permit me to say, with all the seriousness and sincerity demanded by the solemnity of the occasion, that it now is, and always has been, my most ardent desire, as the chief magistrate of this Territory, by all lawful and constitutional means, to secure and protect the just rights of every citizen, and especially in performing my sworn duty of supporting the Constitution of the United States, and taking care that the laws be faithfully executed, to see that the great fundamental principle which lies at the basis of our American institutions, secured by the federal compact, and guaranteed by our organic act of Congress, should be maintained, viz: that the *people of Kansas, in the true meaning of that act, free from all violence, injustice, or foreign interference, should make their own laws, and control their own government.* This has been the great principle, the just and



faithful execution of our organic law, which has controlled all my acts in Kansas, and to which I shall adhere, regardless of menace, calumny, or assailment, either from within or beyond our limits. I am made by law the chief executive officer in Kansas, for the protection, to the extent of my legal authority, of the whole people of Kansas, and not of a part—of every county and district, and not of a portion of them only. And, however solicitous I may be about the result of the present most important election—however most anxious that those views of public policy which I have entertained and expressed at all times from my youth upwards to the present period, and especially as regards the *equilibrium* of our government and the constitutional rights and equality of the States, should now triumph here in October—yet I cannot and will not do any act, or countenance or sustain any act, the effect of which would be to deprive the people of Kansas of any rights secured to them by the federal compact, by our organic act, or by the laws of this Territory. A victory thus secured by violence or injustice would be worse than a defeat, and could only in the end destroy all hope of the ultimate success of conservative principles and constitutional liberty in Kansas.

Inasmuch as our ensuing election on the first Monday in October next is of momentous consequence to this Territory and to our whole country; as the two parties of Kansas, it is hoped, will first measure their strength now, not as in former elections at different times and places, or upon the field of battle, but at the same times and places, in giving in their votes, as in other States and Territories; and as it is of the utmost importance that this election should be free from everything which would lead to excitement or commotion, I most earnestly request the chief officers of our different towns, cities, and municipalities to resort to those means which have so often, in similar cases, proved efficacious, by removing for that day all causes which would interfere with a calm and dispassionate election.

And now, may that overruling Providence who has crowned our beloved country with so many blessings and benefits, including the inestimable privilege of self-government, and without whose aid we cannot look for success in any enterprise, enable us so to conduct this contest as to insure his sanction and the approval of our own conscience, is the fervent hope of your fellow-citizen,

R. J. WALKER,  
*Governor of Kansas Territory.*

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HEADQUARTERS TROOPS SERVING IN KANSAS,  
*Fort Leavenworth, October 5, 1857.*

SIR: I have the honor to enclose for your information copies of certain requisitions from his excellency the governor of this Territory for troops to aid the civil authorities in the preservation of the public peace at the different election precincts where violence was to be ap-

prehended. Also, copies of my replies, with the instructions to the officers in command of the various detachments.

I am, sir, very respectfully, your obedient servant,

WM. S. HARNEY,

*Col. 2d Dragoons, Brevet Brig. General Commanding.*

Hon. JOHN B. FLOYD,

*Secretary of War, Washington city.*

LEAVENWORTH, K. T., *September 26, 1857.*

SIR: Authentic intelligence has been communicated to me that the insurgent government of Lawrence, under the erroneous opinion that the regular troops had all been ordered to Utah, and would not be replaced by others, have passed a compulsory tax law, authorizing the seizure and sale of property, and exacting from their executive officers the enforcement of this ordinance under the solemnity of an oath.

It was sincerely hoped that my proclamation on this subject of the 15th of July last, which has received the cordial approbation of the President of the United States, together with the movement at that date of the troops to Lawrence as a precautionary measure, would have induced the people of that city to abandon their revolutionary proceedings. They have, however, chosen otherwise, under the erroneous conviction before stated, and it becomes necessary, therefore, to station troops again at Lawrence, to meet any emergency which may occur.

Under these circumstances, it becomes my duty, under my instructions from the President of the United States, to request you to direct Major Sherman's battery, supported by one company of artillery, to proceed at once to the immediate vicinity of Lawrence, to act as a *posse comitatus* in aid of the civil authorities in the due execution of the laws and for the preservation of the public peace.

The service of the troops for this purpose will be discontinued so soon as the public exigency will permit.

Respectfully, yours,

R. J. WALKER,

*Governor of Kansas Territory.*

Brevet Brigadier General WILLIAM S. HARNEY,

*Commanding Troops serving in Kansas.*

HEADQUARTERS TROOPS SERVING IN KANSAS,

*Fort Leavenworth, October 5, 1857.*

Official :

A. PLEASANTON,

*Captain 2d Dragoons, Acting Assistant Adjutant General.*



HEADQUARTERS TROOPS SERVING IN KANSAS,  
*Fort Leavenworth, September 27, 1857.*

GOVERNOR: I have the honor to acknowledge the receipt of your communication of yesterday's date, and, in compliance with your requisition, I enclose for your information a copy of special orders No. 77 from these headquarters, directing the movement of Sherman's battery and company "F," 2d artillery, to the vicinity of the city of Lawrence.

Major Sherman has been instructed to report his force to yourself, upon his arrival, to act as a *posse comitatus* to execute such orders as you may deem proper to give him in that capacity.

I am, governor, very respectfully, your obedient servant,

WM. S. HARNEY,

*Colonel 2d Dragoons, Brigadier General Commanding.*

His Excellency R. J. WALKER,

*Governor of Kansas Territory, Fort Leavenworth, K. T.*

HEADQUARTERS TROOPS SERVING IN KANSAS,  
*Fort Leavenworth, October 5, 1857.*

Official :

A. PLEASONTON,

*Captain 2d Dragoons, Acting Assistant Adjutant General.*

SPECIAL ORDERS No. 77.

HEADQUARTERS TROOPS SERVING IN KANSAS,  
*Fort Leavenworth, September 26, 1857.*

I. Company "F," 2d artillery, and light company "E," 3d artillery, under the command of Major T. W. Sherman, 3d artillery, will proceed without delay to the vicinity of the city of Lawrence, in this Territory, in fulfilment of the requisition of the governor of Kansas Territory for their services, as a *posse comitatus*, to aid the civil authorities in the due execution of the law and for the preservation of the public peace.

Special instructions for his guidance will be given Major Sherman.

II. The quartermaster, subsistence, and ordinance departments at this post will furnish this command with the necessary transportation and supplies. Subsistence and forage for two weeks will be required.

By order of General Harney :

A. PLEASONTON,

*Captain 2d Dragoons, Acting Assistant Adjutant General.*

HEADQUARTERS TROOPS SERVING IN KANSAS,  
*Fort Leavenworth, September 26, 1857.*

MAJOR: The general commanding instructs you, upon arriving in the vicinity of the city of Lawrence, in obedience to special orders

No. 77 from these headquarters, to report your force to the governor of this Territory, as a "*posse comitatus*," to execute such orders as he may deem proper to give you in that capacity.

I am, major, very respectfully, your obedient servant,

A. PLEASANTON,

*Capt. 2d Dragoons, Acting Assist. Adjt. General.*

Brevet Major T. W. SHERMAN, *Capt. 3d Artillery,*

*Commanding Troops, &c., Fort Leavenworth, K. T.*

HEADQUARTERS TROOPS SERVING IN KANSAS,

*Fort Leavenworth, October 5, 1857.*

Official:

A. PLEASANTON,

*Capt. 2d Dragoons, Acting Assist. Adjt. General.*

LEAVENWORTH, K. T.,

*September 28, 1857.*

SIR: In pursuance of authority vested in me by the President of the United States, you are requested to direct Colonel Brooks' battery, supported by two foot companies of the 2d artillery, to proceed to Shawnee Mission, commonly called Gum Springs, in Johnson county, in Kansas, to act as a *posse comitatus* in aid of the civil authorities in the due execution of the laws, and for the preservation of the public peace.

You are requested to direct the troops to be present at the place above designated throughout the day of election in this Territory, which is the first Monday of October next. It is desired that the troops should remain at the place above stated only until the day succeeding the election, unless the proper authorities hereafter referred to, in the execution of their duties, should deem it necessary longer to detain them. The United States marshal or sheriff, it is presumed, will be at or near this point, to whom the officer in command should report himself and his force for the objects above specified.

Very respectfully, your obedient servant,

R. J. WALKER,

*Governor of Kansas Territory.*

Brevet Brig. Gen. WILLIAM S. HARNEY,

*Commanding Troops serving in Kansas.*

HEADQUARTERS TROOPS SERVING IN KANSAS,

*Fort Leavenworth, October 5, 1857.*

Official:

A. PLEASANTON,

*Capt. 2d Dragoons, Acting Assist. Adjt. General.*

HEADQUARTERS TROOPS SERVING IN KANSAS,  
*Fort Leavenworth, September 28, 1857.*

GOVERNOR: I have the honor to acknowledge the receipt of your communication of this date, requesting a battery and two companies of the 2d artillery to be sent to Shawnee Mission as a *posse comitatus* to aid the civil authorities at the approaching election to preserve the public peace and to execute the laws.

A copy of special orders No. 78, from these headquarters, is enclosed for your information; and I have further to state that special instructions, agreeably to your desires, have been given Lieutenant Colonel Brooks, commanding, for his guidance.

I am, governor, very respectfully, your obedient servant,  
 WM. S. HARNEY,  
*Col. 2d Dragoons, Brig. Gen. Com'g.*

His Excellency R. J. WALKER,  
*Governor of Kansas Territory, Fort Leavenworth, K. T.*

HEADQUARTERS TROOPS SERVING IN KANSAS,  
*Fort Leavenworth, October 5, 1857.*

Official:

A. PLEASANTON,  
*Capt. 2d Dragoons, Acting Assist. Adjt. General.*

SPECIAL ORDERS NO. 78.

HEADQUARTERS TROOPS SERVING IN KANSAS,  
*Fort Leavenworth, September 28, 1857.*

I. Light company A, with companies E and H, 2d artillery, under the command of Brevet Lieutenant Colonel Horace Brooks, captain 2d artillery, will proceed without delay to Shawnee Mission, commonly called Gum Springs, in Johnson county, Kansas Territory, in compliance with the requisition of the governor of the Territory for their services as a *posse comitatus* in aid of the civil authorities to preserve the public peace and in the due execution of the laws.

Special instructions for his guidance will be given to Colonel Brooks.

II. The quartermaster, subsistence, and ordnance departments at this post will furnish the necessary transportation and supplies for the proper execution of this order. Forage and subsistence for fourteen days will be required.

III. There being no medical officer at this post assignable for service with the detachment of dragoons under orders for New Mexico, the senior medical officer present will employ a suitable person to accompany this command in that capacity.

By order of General Harney:

A. PLEASANTON,  
*Capt. 2d Dragoons, Acting Assist. Adjt. General.*

HEADQUARTERS TROOPS SERVING IN KANSAS,  
Fort Leavenworth, September 28, 1857.

COLONEL: By special orders No. 78, from these headquarters, a copy of which is enclosed, you are directed to repair without delay, in command of light company "A," and companies "E" and "H," 2d artillery, to Shawnee Mission, commonly called Gum Springs, in Johnson county, in this Territory, to aid the civil authorities with your force as a *posse comitatus* at the approaching election, to take place on the first Monday of October next, in preserving the peace and in the due execution of the laws.

You are further instructed by the general commanding to report your force, upon your arrival at the Shawnee Mission, to the United States marshal or sheriff as a *posse comitatus* for the purposes above indicated; and you will remain at that position until after the election, when you will return with your command to this post, unless the civil authorities should deem it proper and necessary still longer to detain you.

You will proceed direct to Shawnee Mission, without passing through Kansas, or any other town *en route*.

Copies of a proclamation by the governor of this Territory will be furnished to you, which will be distributed to the officers of your command; and you will also present a copy to each of the judges of election, and the sheriff or marshal at Shawnee Mission.

I am, colonel, very respectfully, your obedient servant,  
A. PLEASANTON,  
Capt. 2d Dragoons, A. Asst. Adj. Gen'l.  
Brevet Lieut. Colonel HORACE BROOKS,  
Capt. 2d Artillery, Commanding Troops, &c.,  
Fort Leavenworth, K. T.

HEADQUARTERS TROOPS SERVING IN KANSAS,  
Fort Leavenworth, October 5, 1857.

Official:

A. PLEASANTON,  
Capt. 2d Dragoons, A. Asst. Adj. Gen'l.

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LEAVENWORTH, K. T., October 3, 1857.

SIR: Under the authority vested in me by the President of the United States, you are requested to place the troops at the following points in this county, to act as a *posse comitatus* in aid of the civil authorities in the due execution of the laws, for the protection of the polls at the ensuing election, and for the preservation of the public peace:

1st. Two companies of 1st cavalry at the city of Leavenworth.

2d. Two companies of 6th infantry at Kickapoo.

3d. One company of 2d artillery at Easton.

I desire these companies to remain at the points indicated until the

election is over, and that the officer in command at the city of Leavenworth report to me there, and the other officers apply to me for instructions before leaving.

So soon as the election is over, I desire the troops to return to this post.

Respectfully, yours,

R. J. WALKER,

*Governor of Kansas Territory.*

Brevet Brig. General WILLIAM S. HARNEY,

*Commanding Troops serving in Kansas.*

HEADQUARTERS TROOPS SERVING IN KANSAS,

*Fort Leavenworth, October 5, 1857.*

Official :

A. PLEASANTON,

*Capt. 2d Dragoons, A. Asst. Adj't. Gen'l.*

HEADQUARTERS TROOPS SERVING IN KANSAS,

*Fort Leavenworth, October 3, 1857.*

GOVERNOR: I have the honor to acknowledge the receipt of your communication of this date, making requisition upon me for troops to be stationed at different points in this county during the ensuing election, on the 5th instant, as a *posse comitatus* to aid the civil authorities in the due execution of the laws, for the protection of the polls, and for the preservation of the public peace.

I have accordingly issued the necessary orders, in fulfilment of your requisition, and I have given the officers commanding such instructions as will insure a compliance with your desires.

I am, governor, very respectfully, your obedient servant,

WM. S. HARNEY,

*Col. 2d Dragoons, Brig. General Commanding.*

His Excellency R. J. WALKER,

*Governor of Kansas Territory, Fort Leavenworth, K. T.*

HEADQUARTERS TROOPS SERVING IN KANSAS,

*Fort Leavenworth, October 5, 1857.*

Official :

A. PLEASANTON,

*Capt. 2d Dragoons, A. Asst. Adjutant General.*

SPECIAL ORDERS No. 85.

HEADQUARTERS TROOPS SERVING IN KANSAS,

*Fort Leavenworth, October 3, 1857.*

I. Upon the requisition of his excellency the governor of this Territory, the following named troops will proceed to the respective places

in this county designated in this order, by the time of the opening of the polls at the ensuing election, on the 5th instant, to act as a *posse comitatus*, in aid of the civil authorities in the due execution of the laws and for the preservation of the public peace:

1st. Two companies (D and H) of the 1st cavalry, (dismounted,) under the command of Captain Edward W. B. Newby, 1st cavalry, to the city of Leavenworth.

2d. Two companies (A and H) of the 6th infantry, under the command of Captain Thomas Hendrickson, 6th infantry, to Kickapoo.

3d. One company (M) of the 2d artillery, under the command of Brevet Major H. J. Hunt, 2d artillery, to Easton.

Special instructions for their guidance will be given the commanding officers in each case.

II. The quartermaster, subsistence, and ordnance departments at this post will furnish the necessary transportation and supplies for the proper execution of this order. Subsistence for three days will be required.

By order of General Harney:

A. PLEASANTON,  
*Capt. 2d Dragoons, A. Asst. Adjutant General.*

HEADQUARTERS TROOPS SERVING IN KANSAS,  
*Fort Leavenworth, October 3, 1857.*

MAJOR: You are instructed by special orders No. 85, of this date, from these headquarters, to proceed with your company to the town of Easton, some eleven miles from this, on the road to Fort Riley, to be in time for the opening of the polls at the ensuing election in that place, on the 5th instant.

You are further instructed by the general commanding to report your force, upon your arrival at Easton, to the proper civil authorities, to act as a *posse comitatus* in execution of such orders as may be deemed proper to give you in that capacity.

Before leaving this post you will report to his excellency the governor, for certain instructions he is desirous of giving to you concerning the above civil duties. After the election is over, you will return with your command to this post, unless detained by the proper civil authorities for a longer period.

I am, major, very respectfully, your obedient servant,

A. PLEASANTON,  
*Capt. 2d Dragoons, A. Asst. Adjutant General.*

Brevet Major HENRY J. HUNT,

*Capt. 2d Artillery, Commanding Company "M,"*  
*Fort Leavenworth, K. T.*

HEADQUARTERS TROOPS SERVING IN KANSAS,  
*Fort Leavenworth, October 5, 1857.*

Official:

A. PLEASANTON,  
*Capt. 2d Dragoons, A. Asst. Adjutant General.*

HEADQUARTERS TROOPS SERVING IN KANSAS,  
*Fort Leavenworth, October 3, 1857.*

CAPTAIN: By special orders No. 85, from these headquarters, of this date, you are instructed to proceed, in command of companies A and H, 6th infantry, to the town of Kickapoo, to be in time for the opening of the polls at the ensuing election in that place, on the 5th instant.

You are further instructed by the general commanding to report your force, upon your arrival at Kickapoo, to the proper civil authorities; to act as a *posse comitatus* in the execution of such orders as may be deemed proper to give you in that capacity.

Before leaving this post you will report to his excellency the governor for certain instructions he is desirous of giving to you concerning the above civil duties. After the election is over, you will return with your command to this post, unless detained by the proper civil authorities for a longer period.

I am, captain, very respectfully, your obedient servant,

A. PLEASONTON,

*Capt. 2d Dragoons, A. Asst. Adjutant General.*

Captain THOMAS HENDRICKSON,

*6th Infantry, Fort Leavenworth, K. T.*

HEADQUARTERS TROOPS SERVING IN KANSAS,  
*Fort Leavenworth, October 5, 1857.*

Official:

A. PLEASONTON,

*Capt. 2d Dragoons, A. Asst. Adjutant General.*

HEADQUARTERS TROOPS SERVING IN KANSAS,  
*Fort Leavenworth, October 3, 1857.*

CAPTAIN: By special orders No. 85, from these headquarters, of this date, you are instructed to proceed, in command of companies D and H, 1st cavalry, to the city of Leavenworth, to be in time for the opening of the polls at the ensuing election in that place, on the 5th instant.

You are further instructed by the general commanding to report your force, upon your arrival at the city of Leavenworth, to his excellency the governor as a *posse comitatus* to execute such orders as he may deem proper to give to you in that capacity. After the election is over, you will return with your command to this post, unless detained by the proper civil authorities for a longer period.

I am, captain, very respectfully, your obedient servant,

A. PLEASONTON,

*Capt. 2d Dragoons, A. Asst. Adjutant General.*

Captain E. W. B. NEWBY,

*1st Cavalry, Fort Leavenworth, K. T.*

HEADQUARTERS TROOPS SERVING IN KANSAS,  
*Fort Leavenworth, October 5, 1857.*

Official:

A. PLEASONTON,

*Capt. 2d Dragoons, A. Asst. Adjutant General.*



HEADQUARTERS TROOPS SERVING IN KANSAS,  
*Fort Leavenworth, October 11, 1857.*

SIR: I have the honor to report, for the information of the department, that the general election in this Territory, which took place on the 5th and 6th instants, has passed off very quietly, no disturbance or tumult having occurred at any of the polls which have been heard from to mar the peace of the Territory.

The troops have returned from the different election precincts, with the exception of Sherman's Battery of artillery and one company of foot artillery, and these companies have been retained in the vicinity of Lawrence, at the request of his excellency the governor of the Territory.

In view of these facts, I addressed a communication to his excellency the governor, desiring to be informed as to the length of time the present force under my command would, in his opinion, be required; to which he replied, that it would be unsafe to diminish the force now here before the spring. I enclose copies of both these communications.

The important bearing of the governor's answer upon the interest of the military service of this command is so great that I deem it most essential to inform the department of it at the earliest moment. I have therefore instructed Captain Pleasonton, acting assistant adjutant general on my staff, to deliver this despatch, that his thorough knowledge of the service, as connected with the troops serving in Kansas, may be at the disposal of the department, and that my views, of which he is fully possessed, may be the more distinctly and clearly submitted.

Should it be deemed advisable to retain the troops now here until spring, I cannot urge too strongly the necessity of sending immediately an ample supply of lumber to this post from St. Louis, for the purpose of building temporary shelter for the additional nineteen companies that are at present here in camp for the want of quarters.

The increasing demand for the services of our troops on this frontier requires the adoption of every measure which will retain the men in the service when the season of their labors approaches; and I am confident that a timely provision of shelter, with a due regard to the comfort of my command this winter, will render it effective for any emergency that may arise in the spring.

I am, sir, very respectfully, your obedient servant,

WM. S. HARNEY,

*Colonel 2d Dragoons, Brevet Brig. Gen. Commanding,*

Hon. JOHN B. FLOYD,

*Secretary of War.*

HEADQUARTERS TROOPS SERVING IN KANSAS,  
*Fort Leavenworth, October 9, 1857.*

GOVERNOR: The War Department having assembled a large number of troops at this place under my command, with instructions to



fill your requisitions at any time for their services as a *posse comitatus*, it is necessary I should know the probable length of time the presence of this force will be required, that arrangements may be made for their accommodation.

The limited allowance of quarters at this post, and the approach of winter, urge upon me to request of you such information relating to this subject as will enable me to suggest advisedly to the department the proper measures to secure the comfort and efficiency of the troops of this command.

I am, governor, very respectfully, your obedient servant,

WM. S. HARNEY,

*Colonel 2d Dragoons, Brevet Brig. Gen. Commanding.*

His Excellency R. J. WALKER,

*Governor of Kansas Territory, Fort Leavenworth, K. T.*

HEADQUARTERS TROOPS SERVING IN KANSAS,

*Fort Leavenworth, October 10, 1857.*

Official.

A. PLEASANTON,

*Captain 2d Dragoons, Assistant Adjutant General.*

FORT LEAVENWORTH, KANSAS TERRITORY,

*October 10, 1857.*

SIR: In reply to your communication of this date, requesting my views as to the disposition of the large force now here or daily expected, I have the honor to make the following suggestions:

So far as we have heard, the late election in Kansas has led to no violence or tumult. For this result the country is mainly indebted to the just policy adopted here, to the moral influence of the presence of the troops at various points, and to the good judgment evinced by the officers in command.

The prospect of the permanent pacification of Kansas, has been greatly improved by the events to which I have referred. There are, however, important questions still pending here connected with the action of the constitutional convention and territorial legislature of Kansas, which would render it unsafe, before next spring, to diminish the military force now here. I would, therefore, suggest, that this force be retained here for the present, and that it be stationed partly at Fort Riley, and the remainder at Fort Leavenworth, or some point in the immediate vicinage.

If no untoward circumstances should occur this fall or winter in Kansas, it is my belief that thereafter no military force will be required in connexion with the administration of affairs in this Territory.

I am, general, most respectfully, your obedient servant,

R. J. WALKER,

*Governor of Kansas Territory.*

Brevet Brigadier General W. S. HARNEY,

*Commanding Troops in Kansas, &c.*

HEADQUARTERS TROOPS SERVING IN KANSAS,  
*Fort Leavenworth, Kansas Territory, October 10, 1857.*

Official.

A. PLEASANTON,  
*Captain 2d Dragoons, Acting Assistant Adjutant General.*

FORT CLARK, TEXAS,  
*July 28, 1857.*

SIR: I have the honor herewith to transmit a duplicate report of a scouting party under my command, as to await until my arrival at Fort Mason would cause some two weeks delay.

I am, sir, very respectfully, your obedient servant,  
 JOHN B. HOOD,  
*Lieutenant 2d Cavalry.*

ASSISTANT ADJUTANT GENERAL,  
*Headquarters Department of Texas, San Antonio, Texas.*

FORT CLARK, TEXAS, *July 27, 1857.*

SIR: I have the honor to submit the following detailed report of a scouting party under my command, consisting of twenty-four men of company G, 2d cavalry.

On the 5th of July I left Fort Mason, to proceed to a point some fifteen miles west of Fort Terrett, and examined and explored a trail reported by Lieutenant Shaaff to be running north and south. I found no such trail. I then marched for the head of the south Concho. About half way between Fort Terrett and this point, I found a water hole, which is a general camp for Indians passing from Fort Terrett to the head of the Concho, avoiding the San Saba. I proceeded from the head to the mouth of the south Concho, up the main Concho, to Royal creek; thence to its source, and from there to the mouth of Kioway creek, where I struck an Indian trail, about three days old, leading south, with some fifteen animals in the party. I followed it south, then east, to a water hole two miles south of the head of Lipan creek. I then followed them due south, to water holes from thirty-five to fifty miles apart, (this line of water holes being their main route from the lower to the upper country,) and on the morning of the 20th instant, which was my fourth day in their pursuit, I came to a water hole some seven miles above the head of Devil's river, where a second party had joined them; their camp showed that some thirty or forty had camped there. I hurried on, although my horses were very much wearied, and trailed over the bluffs and mountains, down the river, but some three miles from it; late in the afternoon, from the extreme thirst of my men, I left the trail to go to the river and camp. About one mile from the trail I discovered, some two miles and a half from me, on a ridge, some horses and a large white flag waving. I then crossed over to the ridge, without water, supposing they were a party of Tonkaways, as instructions had been received at Fort Mason that a party of Tonka-

ways had gone for their families, and the troops, on their raising a white flag, were to allow them to pass. I cautioned my men not to fire until I ordered it; with my fighting force, consisting of seventeen men, I advanced upon them, about an hour by the sun, with every precaution, ready to fight or talk. They were on a very small mound, but only some ten Indians in sight. I advanced, and some five of them came forward with the flag, and when my party were within some thirty paces, they dropped the flag, set fire to a lot of rubbish they had collected, and about thirty rose up from among the Spanish bayonets, within ten paces of us, with about twelve rifles, and the rest with arrows, besides eight or ten attacked us mounted with lances and arrows. My men gave one yell, and went right in their midst, and fought hand to hand; the Indians, from their heavy fire, beating us back a little, until I rallied my men with their six shooters. Our being within four or five paces, our shots were so heavy we drove them back. One of my men hung his rifle on the cantle of his saddle, to use his six shooter, and an Indian took it off. I forced them back until all the shots of my rifles and six shooters were expended. I then found I could not reload, owing to their deadly fire. I fell back a short distance to do so; if I had had two six shooters to a man, I would have killed and wounded near all of them. The Indians were then busy gathering up their dead and wounded, and leaving, weeping and moaning their loss. In the engagement I killed nine, and wounded ten or twelve. I regret to be compelled to report my loss: one man killed; one man missing, supposed to be killed; one man dangerously wounded; myself and three men severely wounded; one horse killed, and three wounded. After the engagement I had but eleven men to protect my wounded men and horses. I then withdrew to water, which I found about ten o'clock at night. I immediately sent an express to Lieutenant Fink, 8th infantry, commanding Camp Hudson, for a wagon to transport my wounded to his camp. So soon as my wounded were cared for, Lieutenant Fink cheerfully joined me with fifteen men, and we proceeded to the place of action to bury the dead, and make search for the missing man, but no traces of him could be found. From this place the Indians had scattered in all directions. Owing to my small force and the broken down condition of my horses, I was unable to make any further pursuit. I then came to Camp Hudson, and from thence to this post, where I shall remain a day or two to recruit my men and horses, and then proceed to Fort Mason.

It is due my non-commissioned officers and men, one and all, to say, during the scout, in all their sufferings for water, they did their duty cheerfully, and that during the action they did all men could do, accomplishing more than could be expected from their number and the odds against which they had to contend.

From what my guide says, I suppose they were Camanches and Lipans. There were two chiefs; one was killed by my sergeant.

I am, sir, very respectfully, your obedient servant,

JOHN B. HOOD,

*Lieutenant 2d cavalry.*

Lieutenant CHAS. W. PHIFER,

*Post Adjutant, Fort Mason, Texas.*

HEADQUARTERS DEPARTMENT OF TEXAS,  
*San Antonio, August 5, 1857.*

SIR: Lieutenant Hood's report was transmitted last mail; from subsequent information, not official, I think Lieutenant Hood's estimate of the Indian party was much too small. The same party, it appears, attacked the California mail guard five days after, and near the place where Lieutenant Hood had the fight, and they estimated the Indians to be over one hundred. These affairs were in the vicinity of Camp Hudson, where Lieutenant Fink of the 8th infantry is stationed with a company of infantry. If this company had have been furnished with some fifteen or twenty horses, the second attack would not probably have been made. Lieutenant Hood's affair was a most gallant one, and much credit is due to both the officers and men.

I am, sir, very respectfully, your obedient servant,

D. E. TWIGGS,

*Brevet Major General U. S. A., Commanding Dep't.*

Lieutenant Colonel L. THOMAS,

*Assistant Adjutant General,*

*Headquarters of the Army, West Point, N. Y.*

AUGUST 19, 1857.

This combat was, as the commander of the department most justly remarks, "a most gallant one," and I shall take pleasure in taking some further notice of it.

Respectfully submitted to the Secretary of War.

WINFIELD SCOTT.

HEADQUARTERS DEPARTMENT OF THE PACIFIC,  
*San Francisco, California, September 14, 1857.*

SIR: I enclose a report, by Brevet Major Haller, of the murder of a citizen on Whidbey's Island, Puget's Sound, by northern Indians.

This circumstance induces me to bring to your attention the condition of things on the Sound, and renew an application made by my predecessor.

The defence of Puget Sound is to be made good against two enemies, the one, domestic; the other, foreign.

1st. Our own Indians, resident on the shores and along the tributaries of the Sound, estimated at 10,444.

2d. The northern Indians from the British and Russian possessions—annual visitors.

The former reside on the Sound and its tributaries in the winter, and ascend the salmon streams in the fishing season to lay in supplies of fish and berries for the winter.

The winter homes, the hunting and fishing—the only sources of food of this people—are all, more or less, at the mercy of the army.

To defend isolated farm houses against violence, or secure them against the sudden onslaught of an irritated tribe, is not possible, nor is perfect freedom from such dangers expected by our frontier popula-

tion; but to chastise those who perpetrate or encourage outrages is possible; and severe punishment gives future security. Such partial protection against these domestic Indians can be given by the army with the use of the usual means.

Against the northern Indians an army prepared in the usual manner is of no avail.

These Indians are bold and expert boatmen, and daring warriors. They leave their northern homes in large bodies, and enter the Sound in light, well-managed canoes, carrying from twenty to eighty warriors. They have long been the terror of the Sound Indians, and hence are insolent and defiant.

Even their excursions, not begun for mischievous ends, are likely so to terminate, if their violence be not submitted to by those whom they encounter.

Having paid their visit, exhibited their insolent bearing, and, perhaps, as in the case here reported, committed murder, they are speedily placed beyond the frontier and fear of pursuit.

Against an enemy possessing such means of rapid movement and a secure retreat, the army can neither give protection to the inhabitants, nor can it inflict punishment.

The canoe moves at the speed of one of our eastern race-boats propelled by skillful oarsmen. Such boats the army cannot command; nor would its rank and file be expert enough in their management if they could.

I then suggest that the defence of the Sound against the enemy belongs of propriety to the navy; their steamers and boats can close the Sound to the excursionists or punish them.

But if it is still thought proper to devolve the duty on the army, I ask that a small and fast steamer be at its disposal, with a small battery, and only artillerists enough to man it, the steamer can overhaul the enemy and destroy him, or, should he take shelter on shore, transport the nearest garrison speedily to the scene of action.

The steamer, when not so employed, can be usefully used as a transport on the Sound and coast.

The expense of such a vessel here will, I am aware, be heavy. But it is not a question of means of protection, better or worse, of economy, more or less, but this is simply the only means of attaining the end.

I further suggest that the English and Russian authorities be persuaded to restrain their own Indians within their own borders, or led to believe that the frontier will be no barrier.

I am, sir, very respectfully, your obedient servant,

N. S. CLARKE,

*Col. 6th Infantry, Bvt. Brig. Gen. Com'g.*

Lieut. Col. L. THOMAS,

*Assistant Adjutant General,*

*Headquarters of the Army, West Point, N. Y.*

BRIGGS' CLAIM, NEAR FORT TOWNSEND,  
*Washington Territory, August 17, 1857.*

MAJOR: I have the honor to report that, on the night of the 12th instant, a party of northern Indians approached the residence of Colonel J. N. Ebey, on Whidbey's island, and decoyed him into his yard, when they fired upon him. The inmates, alarmed at the firing, escaped through a window on the opposite side of the house, and fled for safety. Daylight revealed the fact that the Indians had plundered the house, and, after severing Colonel Ebey's head from his body, carried off the former with them.

The news of Colonel Ebey's death created the greatest consternation throughout the neighborhood and country. The citizens held a public meeting in relation to their safety. The proceedings will soon be published, when I will forward a copy.

At the request of the Hon. F. A. Chenoweth, associate judge of the United States supreme court, I sent a guard (all I could possibly spare) to a station selected by Lieutenant Colonel Casey, 9th infantry, which commands a view of the straits as far as the islands of San Juan and Vancouver, and will enable a sentinel to perceive, in fair weather, the approach of hostile Indians, and apprise the post as well as the settlers of their advent.

I should be pleased, in case the general commanding approves of a guard being kept at that point, if he would designate some other company to relieve my men, as it is with difficulty I can raise, at this place, nine men for guard duty, having only forty-five men in my company, and part are at work upon the military reserve.

I am, major, very respectfully, your obedient servant,

G. O. HALLER,

*Capt. 4th Infantry, Bvt. Maj., Com'g Post.*

Major W. W. MACKALL,

*Assistant Adjutant General U. S. A.,*

*Headquarters Dept. of Pacific, San Francisco, Cal.*

HEADQUARTERS DEPARTMENT OF NEW MEXICO,  
*Santa Fé, June 30, 1857.*

COLONEL: In reporting the current events of the department for the present month, I have the honor to state, for the information of the lieutenant general commanding the army, that Colonel Bonneville is still in the field, and operating, at this time, against the Coyaltero Apaches, west of the Mogollan mountains. A column of the troops, under direction of Colonel Loring of the rifles, overtook, on the 24th of last month, a party of Indians, and recovered about a thousand sheep. In the affair seven Indians, one of them a squaw, were killed; five women and four children made prisoners. From the reports before me, I feel authorized to say that the expedition is conducted with commendable zeal.

The country on the Gila is represented as being the most beautiful



and fertile of any portion of New Mexico. Sketches of the country visited by the different detachments have been sent to me, and will be forwarded as soon as they can be put in proper shape. A part of the garrison of Fort Defiance having been detached by Colonel Bonneville, the Navijos commenced to show bad faith. I have, in consequence, ordered a company of infantry ("G," 3d) to reinforce them. Colonel Loring's column has also been ordered to take post in that vicinity. The Merzealeros, Jicarrillas, and Utahs, are all reported to be quiet and well disposed.

Most respectfully, colonel, I am your obedient servant.

JNO. GARLAND.

Lieut. Col. L. THOMAS,

*Assistant Adjutant General,*

*Headquarters of the Army, New York.*

HEADQUARTERS DEPARTMENT OF NEW MEXICO,  
*Santa Fé, August 1, 1857.*

COLONEL: I have the satisfaction to report, for the information of the lieutenant general commanding the army, that a battle was fought on the 27th of June, on the Gila river, by a part of the troops under Colonel Bonneville and the Coyotero Indians, in which a decisive victory was won with but little injury to our side; two officers and eight men wounded; none of them mortally. From the report of the prisoners captured, the Indians must have lost thirty-eight men and four women; the bodies of twenty warriors were counted on the battle field. The prisoners taken during the campaign amount to forty-five, principally women and children. This is the first time that our troops have come in contact with these Indians, and the chastisement they have received will be long remembered by them. The effect produced upon contiguous bands will doubtless prove most salutary. It will be gratifying to the general to know that the officers and men evinced the same zeal and gallantry as upon all former occasions in this department.

Special notice is taken of the conduct of Captain Ewell, whose gallantry and sound judgment I have had occasion to notice in former reports. For more particular information, I beg to call the attention of the general-in-chief to the detailed reports herewith enclosed, with my hearty concurrence in their several recommendations.

The campaign under Colonel Bonneville has been prosecuted with energy and perseverance, but I have ordered it to be brought to a close, the presence of the troops being required elsewhere. The captives are, for the present, ordered to Fort Fillmore.

I am, colonel, very respectfully, your obedient servant,

JNO. GARLAND,

*Bvt. Brig. General, Commanding.*

Lieut. Col. L. THOMAS,

*Assistant Adjutant General,*

*Headquarters of the Army, New York.*

HEADQUARTERS GILA EXPEDITION,  
*Depot on Gila, New Mexico, July 14, 1857.*

MAJOR: Herewith I have the honor to transmit report of operations of southern column by Colonel Miles and Captain Ewell. The northern column having been detached on the 22d June, the southern with myself marched on the 23d. On the 24th captured nine Mogolen women. On the 25th attempted to surprise a ranchario; was discovered by the neighing of horses. On the 27th had a battle with Apaches on the Gila river, 35 miles north of Mount Graham or Floridian; killed twenty-four, four women having accidentally been killed in the *mêlée*, and including one afterwards; made twenty-seven prisoners; destroyed many fields of corn; and rescued from captivity a Mexican boy, who escaped to us. We had nine wounded; among those were Lieutenants Steen, 3d infantry, and Davis, 1st dragoons—both slightly, I am happy to say; all are rapidly recovering. Much praise is due to every officer and soldier, particularly to Captain Ewell, who was my active man on all important detached occasions. Colonel Miles was everything I could wish—the same gallant veteran. Lieutenant McCook deserves much credit for the admirable manner in which he managed with his Pueblo Indians, in surprises as well as in battle.

I am, major, very respectfully, your obedient servant,

B. L. E. BONNEVILLE,

*Colonel 3d Infantry, Commanding Gila Expedition.*

Major W. A. NICHOLS,

*Assistant Adjutant General, Santa Fé, New Mexico.*

HEADQUARTERS SOUTHERN COLUMN GILA EXPEDITION,  
*Camp Floyd, July 13, 1857.*

SIR: In making out the report of the battle with the Coyotero Apaches on the 27th of June last, I request you will refer to my journal accompanying this, to see in what manner the wings of the southern column were placed, the difficulty of the march in single file down a tremendous rocky precipice, which extended the column to great length, and which prevented the whole line from coming into action together.

The column was divided on this occasion into two wings; although commanding the whole, I retained the command of the right, giving to Captain Ewell, 1st dragoons, that of the left; it was composed of B, G, and K companies of 1st dragoons, C and F companies of 3d infantry, the guides and spies under Lieutenant McCook, 5th infantry, (being the Pueblo Indians and Captain Blas Lucero's Mexicans,) in advance. Captain Ewell's report, enclosed, states in what manner the battle commenced; at that time you were riding beside me at the head of the right wing, and at least a mile and a half from the battle field, threading our way carefully down a rocky, bushy pathway, followed by a squadron of mounted rifles, under command of Captain Clairborne and Lieutenant Dubois, being in command of B and K



companies of that regiment, and Lieutenants Jackson and Cook commanding B and I companies, 8th infantry. So soon as musketry was heard by us, the order was given to gallop and the charge was made by all, you leading the van to the field of battle. When I arrived, which was not until after Lieutenant Dubois had passed with his company, my first object was to ascertain how the field laid, what the disposition of the troops, and how the enemy was placed. I soon found that Captain Ewell, under his heavy charge of dragoons, had broken the Apaches; they had taken cover in the thick underwood; and that it was the work of infantry to pick them out; that the dragoons were occupying the left bank of the Gila, cutting off the retreat of the enemy to Mount Turnbull, and that Captain Clairborne and Lieutenant Dubois had very properly charged on the right bank and prevented them from reaching the mountains on that side. My object, then, was to bring into action, as soon as possible, the 8th infantry, and re-crossed the river from where Lieutenants Whipple and Steen, with the 3d infantry, were engaged, to give this order, but found, to my great surprise, that Lieutenants Jackson and Cook, with their companies, were already up and actively engaged in the place where they were most required. It was then a primary object to so regulate our firing that our troops should not injure each other, which could easily be done, where all were so anxious to destroy an enemy, in a narrow valley covered with a dense undergrowth of willow. When I re-crossed the river again, I found Lieutenant Steen had been driven out of the bushes by a volley from the dragoons, and Lieutenant Moore actively rallying his men to prevent them firing. When this was accomplished, the infantry dashed into the thicket and soon captured many prisoners. Their frequent volleys showed that many a warrior was sent to his final rest.

The battle field extended for a mile on both sides of the Gila, and, covered with a thick undergrowth, persons within could readily see those outside, but could not be seen within; this gave the enemy a very great advantage, and it is a miracle how so few of our officers and men, exposed as they were, escaped.

I suppose the battle commenced about half-past four p. m.; it lasted until near sunset, when we encamped on the field.

The officers engaged being few in number, I can readily say that all were most distinguished. My thanks are particularly due Captain Ewell for planning the battle and breaking the enemy. In his report he mentions the officers with him who were most distinguished. Of those in the right wing, I would most particularly call your attention to the merits of Captain Clairborne and Lieutenant Dubois, mounted rifles, Lieutenants Jackson and Cook, 8th infantry. The latter had a personal rencontre with an Apache and slayed him with his rifle.

To Assistant Surgeon Haden I am most particularly indebted for his uniform gentlemanly deportment, skillful and kind treatment of the sick during our long and weary march, his daring and bravery in seeking the wounded on the battle ground, and scientific treatment of them to a final cure, under the most unfavorable circumstances—travelling in a litter and on horseback for so many days, under so burning and scorching a sun.

On the 28th of June I ordered an officer, with a detachment of soldiers, to examine the battle field and count the dead. He found killed twenty warriors and four women; two of these women were killed by the Pueblo Indians, one was killed while fighting with a bow and arrows, and the other, I presume, was accidentally shot, for at a short distance only it is difficult to distinguish, by dress, the men from the women, so much are they alike. Twenty-six women and children were taken captive on the battle field; one woman was captured on the Francisco river, making twenty-seven in all. All the camp utensils, clothing, &c., &c., were taken or destroyed. A captive woman informed me that there were forty warriors there when the battle commenced, and she thought but three had escaped. On the 29th or 30th of June Colonel Loring, descending the Francisco, captured a wounded Apache, who informed him that he was in the battle of the 27th, that there were forty warriors and but two had escaped. This corroboration of the same fact would seem to require I should report thirty-seven or eight killed, but only twenty could be found.

I commend to your favorable notice the officers Captain Ewell recommends, viz: Lieutenants Moore, Chapman, and Davis, of the 1st dragoons; also, Lieutenants Whipple and Steen, 3d infantry, and Lieutenant McCook, 3d infantry, and Lieutenant Lazelle, 8th infantry.

My thanks are due to every soldier as well as officer engaged in this battle for their zeal and efficiency and daring bravery. Some of the officers request a particular mention made of the following as being most distinguished: 1st dragoons, Sergeant Perlon, company B; Corporal J. Anderson, Private Donnelly, Private Walsh, of company G; Lance Corporal Lambert, company D, and Private Barraer, of company D, 3d infantry; Sergeant J. Heron, and Private John S. Harper, of company K; Private Thomas McNamara, Thomas P. Morris, and John Brown, of company C; Sergeants Dooling and Morrison, Corporal Maloney, Privates Giles, Mooney, McCardle, Quinn, Woodsmanse, Wies, and Zinzenhaffer, of company F.

8th infantry.—Corporals John O'Donnel and W. Robinson, of B company, Sergeant C. Wolpert and Private McBay, of I company.

The wounded are as follows: Second Lieutenant Davis, 1st dragoons, in the knee; Second Lieutenant Steen, in the corner of the right eye. Both of these wounds were made by arrows.

Corporal Anderson, of G company, 1st dragoons, was wounded twice, by bullet and arrow; Private Donnelly, of the same company, was wounded; also, Private Barrer, of company D, 1st dragoons.

Sergeant Heron, of company K, 3d infantry, was wounded through the arm; also Privates Johnson and McNamara, of C company, 3d infantry, were wounded by arrows.

One Pueblo Indian was badly wounded by ball, and I expect from our own guns, through his own negligence, he having run into an Indian lodge, and coming out with a basket on his head, concealing his red badge, the distinguishing mark of the Pueblos.

Captain Blas Lucero was actively engaged on the field of battle with

his men, receiving and securing the prisoners when brought out of the thicket.

I cannot close this report without making mention that the only officer and company not engaged in battle was Second Lieutenant Edson, commanding G company, mounted riflemen; he was in charge of the rear guard with his company, and performed on that date as fatiguing and arduous a service as any officer or company of the column.

I am, colonel, very respectfully, your obedient servant,

D. S. MILES,

*Lieut. Col. 3d Inf'y, Com'g Southern Column.*

Colonel B. L. E. BONNEVILLE,

*3d Infantry, Commanding Gila Expedition.*

SAN LUCIA, July 13, 1857.

SIR: I have the honor to report my operations while separated from your immediate command. On the 24th of June I was sent to operate against Indians reported in advance.

My command consisted of Lieutenants J. N. Moore, A. B. Chapman, and B. F. Davis, with a detachment of 1st dragoons; Captain Claiborne and Lieutenant Du Bois, mounted rifles; Lieutenants W. D. Whipple and A. E. Steen, with battalion of the 3d infantry; Lieutenants Thomas K. Jackson, John R. Cooke, and Henry M. Lazelle, with battalion of the 8th infantry. Lieutenant Alexander McD. McCook went in charge of spies and guides, (Mexican and Pueblos.) The party of Indians were found by the spies to be only a few women cooking meyeal, and they were all taken prisoners during the night by Blas Lucero, with a party of spies and guides, (Mexican and Pueblos.)

My march was continued towards the Gila river, where Indians were reported in force, until the 27th, when I was joined by the main column. During this interval a party of Pueblos, with an American, were sent to communicate with Colonel Bonneville, but discovered a party of Apaches in ambush, and returned. Their vigilance saved their lives and that of the American. Lieutenant Chapman, with a platoon of dragoons, was then sent back, and afterwards, on the appearance of more Indians, was supported on the flank by Lieutenant Whipple with a detachment of the 3d infantry. The Apaches retiring, Lieutenant Whipple rejoined my column, and Lieutenant Chapman carried his communications to Colonel Bonneville, both executing their allotted duties in a satisfactory manner. A long march was thereby made several miles longer for Lieutenant Whipple's party, but the whole was cheerfully gone through with. Not prepared for so long a separation from the main column, the command was forced to butcher an Indian horse, which was eat by men and officers.

The march was resumed the evening of the 27th, my command consisting of the 1st dragoons, as above; the battalion of the 3d infantry, Lieutenants Whipple and Steen; Lieutenant Lazelle, of the 8th, as-

signed to a platoon of dragoons; Lieutenant McCook with the spies and guides.

The mountain was extremely rugged, and to prevent surprise the infantry and Pueblos were kept in advance. Approaching the Gila the country became level, and the Pueblos soon discovered Indian signs, and told me to "go on with my people." The dragoons were hurried on, and soon came on an Apache camp on the river bank, partly surrounded by thick brush. Lieutenant Moore led the head of the column through the village and across the river, taking up such a position as to cut off all retreat. This well-timed movement went far towards securing the decisive results.

Lieutenant McCook joined the head of the column on the charge, and rendered important personal services.

Lieutenants Whipple and Steen were deployed among the brush, fighting the Indians, and securing a number of prisoners.

Lieutenant Steen was struck by an arrow in the corner of the eye.

Lieutenant Davis, 1st dragoons, was shot in the knee in a personal encounter with an Apache.

Corporal Anderson, company G, 1st dragoons, was twice seriously wounded, (arrow and bullet.)

The wounded were promptly attended by Assistant Surgeon Haden before the action was over.

Captain Claiborne and Lieutenant Dubois, mounted rifles, were early on the ground, and in time to render important services with zeal and efficiency.

The dragoons went forward the same afternoon to another village, but the Apaches had left.

Colonel Bonneville and yourself having arrived before the fighting was over, I do not report the killed and prisoners, some twenty odd of each.

Lieutenant Lazelle, 8th infantry, in charging with the dragoons, shot one Indian and cut down another.

The officers in command of detachments present the following names of enlisted men as active and efficient during the action:

1st dragoons, Sergeant Peslon, company B; Corporal J. Anderson, fighting in the brush, twice wounded; Private Donnelly, wounded; Private Walsh, of company G; Lance Corporal Lambert, company D; Private Barrer, company D, wounded; 3d infantry, Sergeant J. Heron and Private John S. Hafer, company K; Private Thomas McNamara, Thomas P. Morris, and John Brown, company C, "were among the most active men," reported by Lieutenant Whipple.

Sergeants Dorling and Morrison, Corporal Maloney, Privates Giles, Mooney, McCordel, Quinn, Wordmann, Wies, and Zinzenhaffer, of company F, 3d infantry, were favorably mentioned by Lieutenant Steen.

Respectfully submitted.

RICHARD S. EWELL,  
*Captain 1st Dragoons.*

Colonel D. S. MILES,

*Com'g Southern Column, Apache Campaign.*

HEADQUARTERS DEPARTMENT OF FLORIDA,  
Fort Myers, March 8, 1857.

COLONEL: This morning a report of an engagement with the Seminoles in the Big Cypress Swamp, near Bowleg's Town, was received from Captain C. L. Stevenson, of the 5th infantry, commanding four companies of the 5th, and a mounted detachment of forty men. It appears that Lieutenant Freeman, of the 5th, in command of "G" company, was in advance, near Bowleg's Town, and was reconnoitering a spot called the "Garden Hammock," with a small party, when he was attacked by the Indians, and lost one man killed, besides being himself, with three men, severely wounded. He immediately sent an express to Captain Stevenson, who was with the main body at Fort Keais, some 20 miles off.

Captain Stevenson started at once, joined Lieutenant Freeman at sunrise the next morning, (the 6th instant,) made his dispositions to attack the enemy, and after a gallant skirmish of fifteen or twenty minutes, drove them from the "hammock," and put them to flight.

The loss of the Indians is not known; they were seen to take off some dead and wounded; but the density of the "hammock" rendered the exact number uncertain to ascertain.

The loss of the troops was as follows:

Three privates killed, one officer, one non-commissioned officer and four privates wounded.

*Killed.*—Privates, Chilton, of G, McKinn, of I; McClusky, of D, 5th infantry.

*Wounded.*—Second Lieutenant Edmund Freeman, 5th infantry, in the arm, severely; Sergeant Taylor, of H; privates, Bohmer, of G; (since dead,) Gallagher, of H; Donnelly, of K; and Mingle, of G, 5th infantry.

On the third instant, three days before the engagement near Bowleg's Town, four musicians absented themselves from the command at Fort Keais; these men have not since been heard from, and it is presumed by Captain Stevenson the Indians have taken them; their names are not given.

I am, colonel, very respectfully, your obedient servant,

WM. S. HARNEY,

*Brevet Brigadier General, Commanding Department.*

Col. L. THOMAS,

*Assistant Adjutant General, Headquarters of the Army, New York.*

HEADQUARTERS DEPARTMENT OF FLORIDA,  
Fort Brooke, August 30, 1857.

SIR: I have the honor to transmit herewith a report of the operations of one of the boat parties on Lake Okeechobee, which under the skillful direction of Captain Jacob E. Mickler, has performed good service, and met with success beyond my expectation.

On the 24th of August Captain W. H. Kendrick's independent

company of volunteers, stationed in the vicinity of Istokpoga lake, came upon a party of about six Indians; the Indians attempted to escape, but on being pursued took trees; attempted to fire on the pursuing party. All the guns, however, missed fire; and Kendrick reports that he killed a warrior aged about twenty-five years, and captured a child four years old.

I am, sir, respectfully, your obedient servant,

S. LOOMIS,

*Colonel 5th Infantry, Commanding Department.*

ASSISTANT ADJUTANT GENERAL,

*Headquarters of the Army, West Point, New York.*

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TAMPA, August 28, 1857.

COLONEL: I have the honor to report the result of a scout made by me in obedience to your special order No. 83, of July 2, 1857

I departed from this place on the 3d of July and arrived at Fort Kissimmee on the 9th. On the 10th and 11th I remained at the above named post, repairing the boats to descend and examine the Kissimmee river, and also the Okeechobee lake. On the 12th, 13th, 14th, and 15th I descended the river to its mouth, examining the country thoroughly on the east and west banks of the river, without meeting with any Indian or Indian sign whatever. On the 15th I established a depot on the northern shore of the Okeechobee lake. On the morning of the 16th I left camp very early to scout in the direction of Fort Lloyd. I returned to camp the evening of the same day without meeting with any success.

On the morning of 17th I left camp with thirty men to examine the saw grass, east of the Kissimmee river. I discovered a small stream running out of the saw grass. I continued up the stream about three-quarters of a mile, when I came suddenly upon two Indian canoes, hauled into the grass. I landed with twenty-five men, and followed a large trail, which led through an immense saw grass. The trail led towards a small island surrounded by saw grass. As I approached the island I could hear an Indian chopping upon it. I divided my men into two parts and surrounded it. I then ordered a charge, and captured fifteen Indians, six women and nine children. One warrior was seen, and he made his escape through the saw grass. He was fired upon by one or two of the party. Hearing a shot fired in the direction of the boats, I ordered the men to move forward, and I remained with five men to destroy their houses, and prevent the warriors from rescuing the prisoners. In destroying their houses I found four or five pounds of rifle powder and a quantity of lead. The Indian men were concealed in the saw grass, and to judge from their yelling, they were gathering fast, but did not deem it safe to attack my men, as they did not know the number of my men, and my men kept yelling as they advanced towards their boats. I had a great deal of trouble to get the women through the saw grass, and one had to be carried by four men. As we approached the boats I went for-

ward to learn the cause of the shot that was fired there. The men told me that when they heard the report of the shot or two that was fired on the island, one got on a tree, and discovered an Indian running towards them to get his canoe. Four of them ran down the trail to wait in ambush for him, when one of my men's gun went off accidentally, and shot one of the party, (Jesse Turnipseed,) through the thigh. The Indian heard the report of the gun, and changed his course. I then came to the depot, and got the balance of my men and boats, and arrived at Fort Myers on the 23d, and delivered the fifteen Indians to the commanding officer of that place.

Your obedient servant,

JACOB E. MICKLER,  
*Commanding Q. M. men.*

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FORT JOSEPHINE, *August 26, 1857.*

SIR: I started from this place on the morning of the 23d instant with twenty-five of my command, with the intention of exploring the country between this place and the head of Fish Eating creek. Had not marched more than four or five miles before we discovered Indian signs that had not been made more than three or four days. We took the trail, which led for the south of *Istokpoya*. Notwithstanding there had been several hard rains on the tracks we managed to trail them about twelve miles the first day, and encamped on the trail.

Morning of the 24th took the trail but found it impossible to keep it in the flat woods nearing the lake. Near night I took a few men with the intention of examining the southern bank of the lake. Thinking, perhaps, the Indians might have embarked in canoes, if so, we might know the fact, had kept up the side of the lake, through a very dense swamp, without discovering any sign *at all*, when, to our gratification we discovered a small party of Indians running through the swamp, it being so very thick that we only got one sight of them. At that time I ordered a charge. The Indians then stopped and made fight. At least three of them took trees and snapped at us, but they found that we were still making for them, took to their heels again. We fired at them as they ran through the thickest swamp I ever saw; killed one, a young warrior about twenty-five years old, and captured one child between three and four years old. We got all their plunder, which consisted in cooking utensils, axes, hoes, bear skins, buck skins, knives, clothing, &c., &c., &c. It being nearly night I left the swamp and encamped. Was on the trail next morning at sunrise; found that the Indians had not returned to the battle ground during the night, and had so scattered, there being but very few of them, perhaps not more than six. We found it very hard to ascertain the route they had taken, but, perhaps, should have succeeded had it not have been on account of the tremendous rain that commenced falling about ten o'clock and continued during the whole day, which so obliterated the sign that I could follow it no further. I then returned to where we had met those the evening before, and took their back trail, and followed it about eight miles, through



swamp, in mud and water waist deep. When we came to the town that they had left we found it entirely abandoned, and the houses all torn down. It was on one of the islands in the marsh, south of the lake about six miles. They were evidently moving to higher grounds. The Indian child I have here, and will send her in when I get more to send with her, which I hope will be in a few days. The Indian we killed, I think, was the chief of this party, from his superior dress.

I am, sir, very respectfully, your obedient servant,

WM. H. KENDRICK,

*Captain Commanding company F. M. V.*

G. W. HAGGARD,

*A. A. A. G., Fort Brooke, Fla.*

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FORT RIDGELY, MINNESOTA, *April 9, 1857.*

SIR: On the morning of the 19th of March last I received from the headquarters of this post an order to proceed with the effective force of my company to Spirit lake, on the southern border of Minnesota, where, it was reported, certain houses had been plundered and citizens killed by a band or bands of Sioux Indians. The call for assistance came from Des Moines City, on the Des Moines river, some fifteen miles north of Spirit lake. At 12½ p. m. my company, numbering forty-eight, rank and file, was en route to its destination, taking, by advice of experienced guides, a long and circuitous route down the valley of the Minnesota as far as South Bend for the purpose of following as long as possible a beaten track. The season was unpropitious for military operations; the snow lay in heavy masses on the track which I was following, but those masses were thawing and could not bear the weight of the men much less that of the heavy sleds with which I was compelled to travel. The narrative of a single day's march is the history of the whole—wading through deep drifts, cutting through them with the spade and shovel, extricating mules and sleighs from sloughs, or dragging the latter up steep hills or over bare spaces of prairie, the men wet from morning till night and sleeping on the snow; such were the obstacles I encountered while still on the beaten track, the terminus of which was at a farm belonging to a man by the name of Slocum. From this point to the Des Moines was an unbroken waste of snow. An attempt had been made to carry provisions through but had failed.

Mr. Flandreau, the agent for the Sioux, and Mr. Prescott, an experienced guide and interpreter, started with me from the fort and pushed on as far as Slocum's to try and discover the truth or falsity of the report upon which my march was ordered. On their return they stated that nothing definite could be learned, that the roads were almost if not quite impassable, and that as I must necessarily be absent several weeks it behooved them to return. I proceeded to South Bend, on the Minnesota river, where I purchased additional rations, and moved on to Slocum's. On arriving there I learned that the

sleighs which had attempted to cross over to the Des Moines were still on the prairie, at an immense drift some seven miles off. I therefore sent my guide, Joseph La Framboise, to examine this drift and report as to the practicability of my turning or crossing it. He returned and reported that it could not be passed without work. This determined me to remain at Slocum's the next day while a working party should clear the road; by so doing I obtained time to send for a couple of beeves in the vicinity. On the morning of the 26th of March I left Slocum's and commenced the most arduous part of my journey, but before my camp was struck two settlers from the Des Moines came in, ostensibly after provisions, and reported that the Indians (some thirty lodges) were encamped at a grove some eight miles above the settlement, where a half-breed by the name of Coursoll, or "Caboo," as he is known among the Sioux, had located a claim. This report determined me at once to strike for this grove, and I so directed my guide. I scoured the whole grove without success, but finally met Caboo, who informed me that Inkpadutah's band had "wiped out" the settlement and gone to Heron lake, some twenty-five miles off, in the direction of the Yankton country; that he was confident the Indians were there, although their determination was to join the Yanktons who were fighting the troops on the Missouri. Weary from my long march I made my camp, and after reflection concluded that I would still leave the settlement unvisited until I made an endeavor to overtake this band of Sioux. The approach to the lake was somewhat concealed; everything was still and quiet; the guide went ahead, a shot was fired and he turned back; in an instant my men were deployed as skirmishers, and advancing a little quicker on the flanks encircled the grove, but again were we doomed to disappointment. The camp was there, with all its traces of plunder and rapine; books, scissors, articles of female apparel, furs, and traps, were scattered on the ground; the marks of some six or seven tipis (lodges) were there, but they had been struck Friday night or Saturday morning. This was Sunday afternoon—there remained a single chance; some four miles distant was another lake and grove, towards which led the trail of the Indians. I directed Lieut. Murray to mount at once and dash for this grove, but if the signs which he might find there were as old as those before me to lose no time in unavailing pursuit, but to return. This last he soon did with the report that a stop had been made there, but that the guide reported the signs two days' old.

I now present the following as the facts. Some six weeks or two months since Inkpadutah's band, mustering some twelve or thirteen warriors, were hunting in Iowa, on the Inyan Yankey, or Little Sioux river. A dog belonging to one of the settlers attacked an Indian and was killed by him. The owner punished the Indian, and other citizens probably fearing the consequences took the guns away from the whole band, leaving them no means of providing their daily subsistence. These Indians bore no great love to the whites at best; two of the chief's daughters had married Sioux of the Yankton nation, both of whom were with the party. They, determined on revenge, returned to the place where their guns had been stored, found it unguarded, got possession of their arms, and swept the valley of the

Little Sioux up to Spirit lake. On this lake were several houses scattered at wide intervals through the grove; all of these they plundered, killing the inhabitants and probably bearing off with them some women. A man by the name of Markham had been absent from Spirit lake; on his return he went to the house where he boarded, or was employed, and found its inhabitants lifeless on the floor; he ran to another house and found Indian lodges pitched before its door, he then made his way to the small settlement called Springfield, or Des Moines City, and gave the alarm; the inhabitants collected in two houses on the east bank of the river; on the west was a single house belonging to a man by the name of Wood, who carried on a large traffic with the Indians, many of whom resort to the Des Moines during the winter and spring for the purpose of hunting. While the settlers on the east bank sent to Fort Ridgely for assistance this man Wood, with his brother, remained on the west bank, ridiculed their fears, and when Inkpadutah's band came in from Spirit lake, traded with the members until a few days before the troops arrived, and then told them they had better keep out of the way for soldiers were coming. This brought affairs to a crisis; the Indians crossed the river, plundered the vacant houses, found one house unfortunately occupied, its owner, Josiah Stewart, having left the house where the settlers had congregated, and returned to his own homestead with his wife and three children. Here the savages revelled in blood. When I visited the spot the father lay dead on his threshold, the mother with one arm encircling her murdered infant lay outside the door, and by her side was stretched the lifeless body of a little girl of three summers; the eldest, a boy of ten, escaped. Attacks were then made on the two houses of which I have spoken. In one, no damage was done; in the other, a man by the name of Thomas had his arm broken, his son, some ten years of age was killed, and a young woman was slightly wounded. The Indians then crossed the river, killed probably both of the Woods, although I only succeeded in finding the body of one of them, plundered the trading house, and hurried off with an abundance of guns, powder, lead, and provisions, to ascend the Des Moines and join the Yanktons.

While expressing my regret and disappointment that the object of my expedition was not attained, viz: the punishment of the Indians, I would be doing injustice to the officers and men of my company were I not to bring to the notice of the commanding officer the cheerfulness and patience with which they encountered the fatigues of no ordinary march; and perhaps I would be doing injustice to myself did I not assert that I used the best energies of my nature to carry out the instructions which I received.

And am, very respectfully, your obedient servant,

BARNARD E. BEE,

*Captain Commanding Company "D," 10th Infantry.*

First Lieut. H. E. MAYNADIER,

*Adjutant, 10th Infantry.*

HEADQUARTERS, FORT RIDGELY, April 14, 1857.

A true copy.

HENRY E. MAYNADIER, *Adjutant.*

FORT SNELLING, *August 3, 1857.*

GENERAL: Major Sherman, 3d artillery, came in yesterday evening in advance of his company, coming to this post by easy marches from the upper agency, at the mouth of the Yellow Medicine river, about forty miles above Fort Ridgely.

This company is under orders for Fort Leavenworth, and will embark for St. Louis in a few days after its arrival here. The company is expected to arrive the 5th instant.

I have had much conversation with Major Sherman, and also Captain Bee, in relation to Indian affairs.

The Indians, after much difficulty, have agreed to the terms of the superintendent, Mr. Cullen; and Little Crow, a friendly chief of the lower bands, is now out with 130 warriors to capture Inkpadutah and his band. All the Indians have left the agency and gone to their respective homes. The number collected amounted to 5,000, and Major Sherman estimates the warriors, all fully armed, at 2,000. Others carry this number up to 2,500, and even 3,000. The lowest estimate is no doubt the most correct.

About fifty lodges were Yanctons, who do not receive annuities, but were present to demand part of the annuity to be paid the Sissetons, on the alleged ground that the latter, in their treaty, sold some of the lands belonging to the former. A similar demand was made the year previous, and the Sissetons gave the Yanctons part of the goods, but no money.

In order, general, to give you a correct idea of the temper of the Indians, I must be somewhat minute in my detail. After the massacre at Spirit lake the son of Inkpadutah took possession of Miss Gardner; whereupon his wife, belonging to Sleepy Eye's band, left him and returned to her people. When Miss Gardner was delivered up, Inkpadutah's son visited Sleepy Eye's camp to seek and obtain, as some suppose, his wife. Others take the ground that this band sympathized with the murderers and harbored this Indian, who was afterwards killed.

With this latter view of the case, under the instructions from Washington, payment of the annuities was withheld.

This measure exasperated the Indians, especially the Sissetons, who say they should not be held responsible for the acts of Inkpadutah and his followers, for they are not allied to them by blood, or in any manner whatever.

Judge Flandreau, then the agent, learning that Inkpadutah's son was in Sleepy Eye's camp, requested of Captain Bee, commanding at Fort Ridgely, some troops to take the Indian captive. Lieutenant Murray, 10th infantry, with a small detachment, was sent with instructions to make the capture, but not to molest any women and children. A charge having been made upon the camp by the troops, the Indian ran, but was subsequently found and killed.

The agent then desired to capture the wife, which the lieutenant objected to, but she was taken; and this greatly exasperated the Indians, a number of whom armed themselves, proceeded to the agency, and demanded the return of the woman, which was done by

the agent; and then the Indians demanded two beeves as a recompense, which also was granted. Before this time a call was made on Major Sherman to send troops to the agency about the 5th of July, the time for the payment of the annuities. He proceeded from this post with his battery, and was joined by a detachment of Captain Bee's company. His presence was of the first importance, for when the Indians were informed they must deliver up Inkpadutah and his band before they would be paid their excitement was great. You may judge of the effect upon the whites when informed that many of the employés of the Indian department went off entirely without receiving their pay. But for the presence of the troops it is thought the agency would have been attacked and pillaged. Colonel Abercrombie's arrival at Fort Ridgely with four companies 2d infantry was most opportune; and the Indians, being entirely ignorant of this movement, were greatly surprised. Major Patten's company was detached to the agency to relieve the detachment of the 10th infantry, and Major Sherman was further reinforced by a second company (Sully's.) The Indians were called to council on several different days, but they presented themselves armed, and they were accordingly dismissed. In the evening of one of the days a soldier of Major Patten's company, going a short distance from the camp, was stabbed in the back by a Sisseton. About this time Little Crow came up with some of his friendly Indians, and going to Major Sherman offered his assistance in case of an attack, which, it was reported, would be made that night. Major Sherman put no faith in the report. After examination showed that the Sisseton who stabbed the soldier acted without the knowledge of his people. He, though a Sisseton, was, on the side of one of his parents, a Yancton. On the day referred to the superintendent gave the Sissetons some provisions, and this Indian wished his people to share with the Yanctons, which was not done. High words passed between the chief and this man, and the former called him a coward, when the latter said he would show him before night whether he was a coward. The Indian was disarmed, but it seems his knife was overlooked. He lurked about the camp of the troops, and seeing a single soldier stabbed him. This act caused considerable excitement amongst the troops, and Lieutenant Spencer, 2d infantry, with a small command, was sent to demand the Indian. He was received by an armed party of Indians, who cocked their guns as he approached. He dismounted from his horse, halted his men, gave his pistol to a soldier, and advanced alone. A peremptory refusal was given to his demand. Next day the chiefs, after much delay, agreed to deliver up the man, and he was brought; but when Major Sherman went to receive him, the young men took possession of the Indian and carried him off. This was a critical moment for the major, for had he then opened a fire, which he might have done, war was inevitable. To further demands the Indian was given up and placed in charge of the guard. The night previous to this Little Crow passed in the Sisseton camp, and by his entreaties induced these Indians to agree to the terms of the superintendent, by sending two warriors from each band (all to be under Little Crow) after the murderers.

In the council which followed the arrangements were made; but

near its close the Indian in confinement, sitting in front of the guard tent, sprang to his feet and ran in the direction of the council, supposing, no doubt, that the guard would be afraid to fire lest the balls would take effect upon the officers and others in council. The guard saw the danger, but fired low, and six balls pierced the legs of the Indian. Major Sherman afterwards told the Indians that he cared nothing further about the man. After the council was over the Indians broke up their camp and moved off. Major Sherman remained at the agency three days thereafter, and on the 27th instant commenced his return march.

Inkpadutah's people, few in number, are very much scattered, and Little Crow may have difficulty in capturing any of them. Even if he should fail, I would think it good policy to pay the annuities; for the annuity bands, as they are called, have nothing to do with the murderers.

I have the honor to be, very respectfully, your obedient servant,  
 L. THOMAS, *Assistant Adjutant General.*  
 Lieutenant General WINFIELD SCOTT,  
*Commander-in-chief, West Point, New York.*

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FORT SNELLING, *August 10, 1857*

GENERAL: I have the honor to report my return to this place yesterday from Fort Ridgely, after an absence of seven days.

Whilst at the fort I had a full conversation with Lieutenant Colonel Abercrombie, the commanding officer, and also with Mr. Cullen, the superintendent of Indian affairs, who arrived from the agency about the same time I reached the post. According to all I could learn, I judge that the Indians are perfectly quiet, and will comply, as far as they can, with the demands of the superintendent in reference to Inkpadutah's band. Little Crow had just returned to the agency from his expedition against their people. Towards the evening of July 28, I think, he found a party of them on Skunk lake and attacked them, and after about twenty minutes drove them into the water. Three men were killed, (one of them another son of Inkpadutah,) one badly wounded and taken prisoner; he managed to escape during the night. Two women and one child were taken prisoners and brought in; one the discarded wife of a brother of Inkpadutah; the other now the widow of one of the men killed. All the property of the party was taken. Inkpadutah was not with this party, but the report is that he and his immediate family have gone to the vicinity of the Missouri river, in the country of the Yanktons, and perhaps has crossed that river. The band who committed the murders on Spirit lake consisted of twelve men and two boys; four men have been killed and one badly wounded. The wounded man was shot in both arms (breaking the bone of one,) and in the side.

I have the honor to be, very respectfully, your obedient servant,  
 L. THOMAS, *Assistant Adjutant General.*  
 Lieutenant General WINFIELD SCOTT,  
*Commander-in-chief, West Point.*

P. S.—The Indian who stabbed the soldier at the agency has since died of his wounds.

HEADQUARTERS, FORT RIPLEY, M. T.

*October 7, 1857.*

SIR: The report of the intended abandonment of Fort Ripley in June last spread like wildfire among the Indians, producing a marked change in their conduct. They became insolent and reckless in their bearing towards the whites. No sooner had the troops left the garrison in July last than their outbreaks commenced. They attacked the mission buildings of the Rev. Mr. Breck at Leech lake; broke in his windows and demanded whatever they wanted.

After the lapse of a day or two the same thing was repeated, and, bent on violence, they seized a calf and killed it. Two others (nude with the exception of the breach apron) and flourishing their knives, demanded Mr. Breck, and when he would not come out (as he thought they intended murdering him) they attempted to get in at the window and were only prevented from accomplishing their purpose by some squaws, who, as often as they attempted to get in, pulled them back.

As the mission under these circumstances could only sustain itself by meeting violence by violence, and this probably only for a short time, and the occupants thinking themselves in imminent danger of their lives, Mr. Breck, the mission family, and most of the government employes left and arrived at Fort Ripley on the 12th of July. This was followed by several instances of plunder. One Mr. Miracle, at Otter Tail lake, was robbed of all his provisions and groceries by a band of the "Pillagers." A party of about fifteen men, getting out lumber in the employ of a citizen of St. Anthony, were attacked, robbed of all their provisions, and forced to return to Crow Wing. On the 11th of August, a party of Indians killed a cow, stated by the Rev. Mr. Peake as belonging to the Gull lake mission. A portion of the cow, the Rev. Mr. Maney was credibly informed, (as he states,) was sent by the Indians as a present to Hole-in-the-Day, the head chief.

On the 15th of the same month an inoffensive German was murdered within a few hundred yards of the mission buildings at Gull lake by two Indians and a half-breed. The three murderers were arrested by members of the mission and brought the next day (Sunday) to Fort Ripley, under the idea (as the Rev. Mr. Peake states) that troops had already arrived at the garrison. As such was not the case, the Rev. Mr. Maney, the chaplain, who was still residing at Fort Ripley, hired a team and gave instructions to the young men who had the murderers in charge, to take them to Belle Prairie before Justice Hamilton, the nearest committing magistrate, and have them duly committed; and as the sheriff resided at Little Falls, about five miles beyond, it would be best that they themselves should deliver the criminals into the hands of the sheriff. They accordingly did so. Sheriff Pugh left Little Falls with the murderers shortly before noon on Monday, having them well secured, for the purpose of safe confinement either at St. Paul or Fort Snelling. When about seventeen miles from Little Falls the sheriff was overtaken by a mob of armed men who rescued the prisoners, brought them back to Swan river, and hung them about nine o'clock in the evening. In the morning they cut



them down and buried them in one hole, chained together as they were hung. Immediately on these things being known there was intense excitement among all the Indians, accompanied by threats of revenge. Man for man could alone satisfy them. As the murderers were arrested by members of the mission at Gull lake, these Indians seemed to hold them responsible for the lynching and hanging of the prisoners, and consequently they were the first to feel the fury of the storm. Fearing that the lives of some of them would be sacrificed, Mr. Peake, with the other members of the mission, again left Gull lake on the morning of the 20th and arrived at Fort Ripley the same day.

On the 22d (Saturday) Mr. Maney and Mr. Peake rode to Crow Wing. About 3 p. m. Crow Feather, the principal brave of Hole-in-the-Day, a man whose bravery and truthfulness are proverbial among the whites and Indians, came into town slightly intoxicated. He communicated to Mr. Clement Beaulieu, his nephew, Hole-in-the-Day's plan, as made known to some six or eight of his braves on the night previous, viz: that he and one other should proceed to Crow Wing and kill the first white man they met, and that six others should proceed immediately to Gull lake and burn the mission buildings, church, and other property.

It is said of Crow Feather that he refused to enter into the plan of murdering the white men, saying that he had been among the whites a great deal, and had received nothing but kindness from them.

About this time another Indian was seen skulking through the bushes, naked all but his breech-apron, a convincing proof to the whites that his purpose was that of murder.

To prevent, if possible, the murder of any white man, and the destruction of the mission buildings, a note signed by the Rev. Mr. Maney, Beaulieu Fairbanks, and some half dozen others of the principal persons about Crow Wing was immediately addressed to Hole-in-the-Day, to the effect that they were aware of his intentions, and knew that he was inciting a number of Indians to deeds of violence and murder, and if he persisted in carrying out his intentions he would be brought to a speedy and summary punishment. This note was delivered and read to him that afternoon. A party of Indians, however, had gone to Gull lake for the purpose, it was suspected, of burning the mission, and were found secreted around the buildings by an Indian who had been left in charge of them. Through his persuasion they were induced to desist from their purpose, he remarking, that if Hole-in-the-Day wished the mission burned he had better come and do it himself.

Crow Feather further stated that Hole-in-the-Day had addressed his braves, or some of them, in this wise: "That they were fools, or they would first burn the agency, then Crow Wing, and then Little Falls and Swan river."

I am told by the Rev. Mr. Maney that the excitement, resulting from the lynching and hanging of the Indians who committed the murder, during its highest pitch, was greatly allayed by the report (premature) that troops were on their way to Fort Ripley, and that the prisoners had been *taken and hung by the troops, instead of by a mob of citizens.*

They are, at present, apparently quiet, although among them are many turbulent young men, whom their chiefs seem unable to restrain.

Major Heniman informs me that the reason assigned by the Indians for plundering is, that the property, &c., at the Mission *belongs to them*, it having been purchased by funds intended by the government for their use and benefit, and which has not been so appropriated.

However this may be, it can hardly be deemed an excuse for murdering in cold blood an inoffensive citizen in nowise connected with the Mission.

Very respectfully, I am, sir, your most obedient servant,

G. W. PATTEN,

*Capt. 2d Artillery, Brevet Major, Com'g Post.*

ASSISTANT ADJUTANT GENERAL,

*Headquarters Department of the West, St. Louis, Missouri.*

No. 6.

REPORT OF THE QUARTERMASTER GENERAL.

QUARTERMASTER GENERAL'S OFFICE,

*Washington City, November 21, 1857.*

SIR: In obedience to your instructions, I have the honor to submit a report of the operations of the quartermaster's department during the fiscal year commencing on the 1st of July, 1856, and ending on the 30th of June last.

At the date of my last report, the balance in the hands of the officers and agents of the department to be accounted for was..... \$923,615 86

From which are to be deducted the following sums allowed by act of Congress to the officers named below, viz:

To Captain L. C. Easton.....	\$17,651 00	
To Captain F. Steele.....	2,000 00	
To Captain A. Montgomery.....	6,272 12	
To Major J. Belger.....	9,300 00	
		35,223 12

Leaving actually to be accounted for .....	888,392 74
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To which is to be added: 1. Remittances, viz:

In the 1st quarter of the fiscal year....	1,834,866 11
In the 2d quarter of the fiscal year....	1,635,535 77
In the 3d quarter of the fiscal year....	1,392,236 22
In the 4th quarter of the fiscal year....	1,428,325 11

6,290,963 21

Amount brought forward.....	\$6,290,963 21	
Add remittance from adjutant general on account of "Military Tactics"...	500 00	
2. Proceeds of drafts drawn prior to 1st July, 1857, paid since that date	68,366 37	
3. Proceeds of sales of public property, rents of buildings, &c.....	94,594 84	
	<hr/>	\$6,454,424 42
Total to be accounted for .....		7,342,817 16
From which is to be deducted: 1. Expenditures, viz:		
Prior to the fiscal year, the accounts for which were not received in time for the last annual report.....	\$1,043,229 82	
In the 1st quarter of the fiscal year ....	922,326 95	
In the 2d quarter of the fiscal year.....	1,574,937 48	
In the 3d quarter of the fiscal year.....	1,515,586 95	
In the 4th quarter of the fiscal year....	1,695,593 54	
	<hr/>	
	6,751,674 74	
2. Deposits to the credit of the Treasurer	12,326 30	
	<hr/>	6,764,001 04
		<hr/>
		578,816 12
From which should be deducted a small sum advanced to Captain Scammon, late of the army, for his own transportation, for which he has not accounted ; but, as he is known to have performed the journey for which he received it, he no doubt expended it...		350 00
		<hr/>
		578,466 12
		<hr/> <hr/>

Late Lieutenant W. A. Slaughter, who was reported in my last annual report as having failed to account for \$8,055 99, was killed in battle with Indians in Washington Territory. It is believed that he expended the greater part, if not the whole of the amount for which he was accountable. No vouchers have been received since his death, and in the hazardous and difficult service on which he was engaged when he fell, his papers were probably all lost. I respectfully submit whether it would not be just to ask Congress for authority to close his accounts.

From thirty-three officers whose joint accountability amounted to \$65,106 98, accounts have not been received for the last quarter of the fiscal year. Many of them are at the extreme outposts and on the way to Utah, and will no doubt account for the small amounts in their hands, as four of them have already done in the first quarter of the present year. The joint accountability of those who have still to account is \$58,783 49.

Major Osborne Cross, late principal quartermaster on the Pacific, was accountable on the 30th of June for \$23,442 21, which should

have been turned over to his successor ; he has since presented accounts for \$804 30, which reduces the balance against him to \$22,637 91.

The remainder of the sum unaccounted for was divided among one hundred and forty-seven officers at the posts and depots, and in the field, throughout our wide spread territory, the greater part of which, it is ascertained from accounts received for the present year, has been already accounted for.

The amounts paid during the year, including purchases made, and for services rendered in the preceding year, and not included in my last annual report, were—

1. For regular supplies of the quartermaster's department, viz :

Fuel .....	\$130,094 71	
Forage .....	1,414,461 01	
Straw for soldiers' bedding.....	5,143 48	
Stationery.....	13,497 86	
Making a total of.....		\$1,563,197 06

2. For incidental expenses—

Postage on public letters, &c.....	\$6,528 56	
Expenses of courts martial.....	12,015 11	
Expenses of expresses and escorts.....	24,728 85	
Interment of deceased soldiers.....	220 59	
Hire of guides, interpreters, and spies	33,552 09	
Hire of clerks and agents.....	85,379 24	
Pay of wagon and forage masters.....	7,438 59	
Hire of laborers.....	147,870 67	
Pay of extra duty of soldiers.....	133,581 69	
Hire of veterinary surgeons.....	1,286 82	
Office furniture.....	2,177 51	
Horse medicines.....	4,329 18	
Portable forges, blacksmiths' and shoe-		
ing tools .....	3,088 52	
Horse shoes, nails, iron, and steel .....	22,756 08	
Dragoon service .....	937 92	
Apprehension of deserters.....	11,999 43	
Making a total of.....		497,790 85

3. For the purchase of horses for dragoons, cavalry, mounted rifles, and light artillery..... 148,841 21

4. For barracks and quarters, viz :		
On account of rents.....	\$119,164 59	
On account of construction and repairs	492,864 45	
Making a total of.....		612,029 04

5. Mileage, or transportation of officers and their baggage, when travelling on duty without troops, escorts, or supplies..... 114,017 99

6. For transportation of troops, subsistence, quartermaster's stores, ordnance stores, medical stores, and for means of transportation..... 2,900,915 11

7. For materials for and amount expended in the preparation of clothing, camp, and garrison equipage..... 870,892 10

8. For special appropriations for barracks, mounting additional companies of light artillery, &c.....	\$35,705 38
9. For amount paid for other departments.....	18,129 78
Total expenditures.....	<u>6,761,518 52</u>

Clothing, camp and garrison equipage were provided and furnished to all the troops throughout the Union in the quantities in which they were due. Owing to the different, distant, and dispersed state of the troops, it is necessary to have depôts of clothing and equipage in Kansas, New Mexico, Texas, and on the coast of the Pacific. Storehouses should be provided at several points in the States and Territories named, with accommodations for assistants, so that the property may be preserved, and the wants of the service supplied as they arise.

As stated in my last annual report, clothing, often from causes beyond the control of the officers who have charge of it, becomes damaged or injured sometimes slightly. It is then examined by a board of survey, condemned as unsuitable, and turned over to the quartermaster of the post to be disposed of at public sale. When sold it brings but a small part of its real value; and the pecuniary loss is not the greatest evil; for if the sale of clothing and equipage be allowed at all, the soldier will sell good clothing to citizens, and clothing thus sold will probably be represented by the purchaser to have been bought at some of the public sales. In both cases the public must replace the articles sold, and at the additional cost of the transportation at least. I recommend that the clothing injured be issued to the troops at the value assessed by the board of officers, and that all sales of clothing, except to soldiers, be prohibited by law.

The various regular supplies, viz: fuel, forage, straw, and stationery, have been promptly furnished to the several officers, corps, and branches of service to whom they were due.

Transportation was furnished during the year for all the supplies required for the army at the different posts; for the troops operating in the field; for about 3,515 recruits from the recruiting depôts to the regiments and companies to which they were assigned; for the 5th regiment of infantry from the positions which it occupied in Florida to Jefferson barracks, Missouri; for the troops under Colonel Sumner operating against the Cheyenne Indians, including the command of Lieutenant Colonel Johnston; for troops moving to and operating against the Indians in Texas, New Mexico, Oregon, and Washington Territories. In addition to which, measures were taken to provide for the transportation of troops and supplies ordered to the Territory of Utah.

In regard to barrack accommodations for officers and soldiers, all was done which the limited appropriations confided to the department warranted. In the department of the east, (including all the posts east of the Mississippi and not in Florida,) the construction of quarters was commenced at Carlisle, in Pennsylvania, under a special appropriation made by Congress to replace those burnt, and necessary repairs were made to other buildings there. Repairs were also made

at Fort Sullivan, Fort Independence, Fort Adams, New York harbor, Fort Ontario, Fort Niagara, Fort Mackinac, Fort Brady, Pittsburg, the clothing arsenal at Philadelphia, Fort McHenry, Fort Monroe, Fort Johnston, Fort Moultrie, and Baton Rouge. At many of these posts new buildings are required for quarters, barracks and storehouses. Extensive repairs are necessary, but larger appropriations than I have ventured to ask for will be necessary to complete the work.

In the department of Florida expenditures have been made for repairs at Key West, Fort Dallas, Fort Capron, Fort Mellon, Fort Myers, Fort Brooke, and other posts.

In the department of Texas a kitchen and fence were put up at Fort Brown, and ordinary repairs made at Camp Cooper; a building for the accommodation of troops, and to secure the public property, was erected by the troops.

At Fort Belknap a set of officers' quarters was built by the troops. At Fort Duncan quarters were erected for a company, and additions and repairs were made to other buildings. At Fort Clark quarters and a stable were erected, additional quarters commenced, a magazine completed, and various repairs made. At Fort Lancaster barracks were in the course of construction. At Camp Verde quarters, barracks, a smiths' shop, and stables for camels were erected. At Forts Chadbourne and Mason, quarters were in the course of construction, and necessary repairs made. At Ringgold barracks, Fort Davis, Fort McIntosh, Fort Bliss, Fort McKavett, Fort Inge, San Elizario, San Antonio, Camp Colorado, and Indianola, repairs have been made.

At many of the posts in Texas extensive buildings are required for the comfort and health of the troops, and for the security of the public property; but the United States own no lands there, and the War Department cannot purchase land without the authority of Congress. The buildings erected at the posts in that State are, therefore, of temporary character, and are constantly requiring repairs.

In the department of New Mexico repairs were made at Fort Fillmore, Fort Union, Fort Thorn, Fort Defiance, Albuquerque, Cantonment Burgwin, Fort Craig, Santa Fé, Los Lunas, Fort Stanton, Camp Calabazas, Fort Marcy, and Fort Buchanan; and it is known unofficially that buildings were erected or commenced, but not having any official information on the subject, I am unable to report them.

In the department of the Pacific repairs have been made at Fort Yuma, San Diego, Fort Tejon, Fort Miller, Benicia barracks, Fort Vose, Fort Jones, Fort Orford, Cascades, Fort Simcoe, Fort Walla-Walla, Fort Yamhill, Fort Hoskins, Fort Steilacoom, Fort Humboldt, and the posts at Fort Townsend and Bellingham bay. At Umpqua, additional buildings were erected; at Fort Vancouver, a stable was erected and repairs made; and at Fort Dalles, barracks, quarters, and storehouses were erected or were being erected. To accommodate the troops comfortably in this department, and to secure the public supplies, a large appropriation will be required.

In the department of the West repairs were made at Fort Smith, Fort Washita, Fort Gibson, Fort Pierre, Fort Ridgely, Fort Ripley, Fort Snelling, Fort Look-out, and at Fort Kearney. At Fort Ran-

dall, barracks and other buildings were in the course of construction; at Fort Leavenworth, barracks, quarters, and storehouses were completed, and necessary repairs were made; at Jefferson barracks, extensive repairs were commenced on other buildings, and were completed since the close of the fiscal year; at Fort Arbuckle, buildings were being erected, and repairs were made to others; at Fort Laramie, a building for hospital, mess, and store-room and kitchen was erected, and a shed building was also put up; at Fort Riley, the hospital was completed, and repairs made. As this is an important outpost, and might be used as a depot, additional quarters and barracks for four companies, at least, should be erected; in addition to which there should be storehouses for the commissary's and quartermaster's stores and clothing, stables for draught and express animals, and cisterns to each of the buildings, including the stables, so as to secure a supply of water. All the water used at the post has now to be hauled a long distance. By having cisterns, water for all purposes might be saved, and of a better quality than is now used. They would last many years, and would save the cost of constructing them in two years, and in case of fire would be invaluable.

The estimates presented for the next fiscal year, though much larger than any previous estimates since the war with Mexico, are for not more than will probably be required under any state of the service likely to exist.

The estimate for fuel for the last fiscal year, as calculated at this office, was \$130,000, but it was required to be cut down to \$114,000. The sum actually paid for fuel during the year was \$130,094 71, and there are outstanding debts which will probably swell the expenditures to \$150,000. The allowance of fuel to the army as at present organized is, under existing regulations, 68,627 cords of wood, or an equivalent in coal; but as the regiments and corps are not always complete, and when on the march or in the field the troops either supply themselves or receive a reduced allowance, not more than two-thirds of the allowance is purchased, and issued to officers and soldiers; this, at three dollars and fifty cents a cord, would exceed the sum estimated. The price of wood varies from \$2 50 to \$7 and \$10, and at a few stations a still higher rate; and at some stations where the troops cut their own fuel, the public has to pay the owners of the land for it. This is the case at many of the posts in Texas, and will be the case in Kansas and other Territories when the public lands shall be taken up. At Fort Leavenworth, where the troops formerly cut their own fuel, they are now necessarily supplied by purchase, at a rate equal to the cost of fuel here. Unless the allowance be reduced, I cannot venture to ask for less for the next fiscal year, (when all the public lands in the new Territories bearing wood will probably be appropriated by private citizens,) than the sum estimated.

As to forage, the estimate last year for the present fiscal year was for 11,043 animals, including those of the mounted corps; but two companies of light artillery have been since mounted, and the animals of the quartermaster's department have been considerably increased. The estimate for the next year is for 12,533 animals, being for 1,872 animals less than we have now in the service. For the forage



for that number of animals, at the rates at the several posts at which the troops are distributed, the cost would be \$2,128,611, and as the present regulations authorize straw for the bedding of public animals, the cost of which, if furnished, would be \$50,000—

That sum has been added, making .....	\$2,178,611 00
From which has been deducted for periods when the animals will be grazed, and either receive no forage, or a reduced allowance.....	628,611 00
Leaving .....	<u>1,550,000 00</u>

For which an appropriation has been asked.

The sum paid for forage in the last year was \$1,414,461. The expenditure will be greater this year, and if operations equal to those carried on this year be continued next year, the whole amount estimated, probably more, will be necessary.

For the milage of officers when travelling on duty, without troops or supplies, ten thousand dollars has been added to the estimate for the last and present years to meet the increased expense under the new regulations, and the increased travel caused by the greater extension of our outposts.

The estimate for transportation is much larger than any other estimate since the war with Mexico. This increase is necessary from the greatly extended operations of the troops. The amount paid on account of transportation for the army and its supplies, and for means of transportation, as far as accounts have been received, amounts to \$2,900,915. The cost for transportation in the present year will greatly exceed that sum, and next year it will not probably fall short of the estimate.

Our army, though not more than fifteen thousand men, performs more duty, and carries on more extensive operations than any hundred thousand men in any other service in the world. Long, rapid, and expensive movements have frequently to be made during every year to supply the lack of numbers.

I submit herewith a military map of the United States, on which are laid down most of our important outposts, with the routes to and between them. On this map will be seen a dark line, extending from Fort Wilkins, on Lake Superior, to the mouth of the Sabine, on the Gulf of Mexico. That line connects all the extreme outposts of the country occupied on the 30th of June, 1845. Within that line there were only two posts of two companies, each supplied by land transportation, and on lines shorter than from Baltimore to Philadelphia. We now occupy the whole territory west to the Pacific, and south to the Rio Grande and the south boundary of New Mexico. Most of the territory now occupied is, in a great measure, without resources—some of it with nothing but a scanty crop of wild grass; and some of the lines of land transportation are from twelve to fifteen hundred miles in length. Where active operations are carried on in such a country, (and to defend the frontier constant operations are required,) a vast outlay for transportation is unavoidable.

Efforts have been made, and powerful influence brought to bear upon the War Department, and upon this office, political as well as military, to force the purchase of a steamer, to be employed on Puget's Sound. I have steadily opposed the scheme as a military measure, because if a steamer be necessary there it is required more as a means of defence than of transportation; and in that view, it seems to be more properly a naval than a military measure. The army is bound to defend the land, but it is the business of the navy to prevent attacks by water.

In 1848 I sent to the Pacific, by order of one of your predecessors, two steam-propellers, the Massachusetts and the Edith. They, with several sail vessels sent out at the same time, it was believed, would be sufficient, or nearly so, to perform all the sea transportation of the army on that side of the continent. The President directed that both should be turned over to the navy, which was done. The Edith was wrecked, but the Massachusetts has been in the naval service ever since. If we are to be taxed with the expense of running a steamer on the Pacific, I hope the Massachusetts may be repaired, and turned over to us in a condition equal to that in which she was when transferred to the navy.

Should it be decided to build or purchase a steamer for Puget's Sound, an additional sum to the amount estimated for transportation will be necessary.

In my last annual report I adverted to the necessity of additional clerks for this office. The increase of the army, and the great accumulation of business consequent upon that increase, and the vast territory which the troops occupy, render, at least, four additional clerks necessary, for the prompt and critical examination of the numerous accounts, returns, and reports received at this office, and to keep an account of the large amount of property purchased for the public service, and the disposition made of it. Books should be kept in which we should be able to show, at any time, the whole amount of property received, disposed of, and on hand. Lack of force alone has prevented me from causing such books to be opened and kept.

Owing to the heavy expenditures last year, which will be charged upon the appropriations for the present year, as well as the expenditures for the Cheyenne and Utah expeditions, neither of which was contemplated when the estimates for the present year were presented to Congress, a large appropriation for deficiencies will be required; and if similar operations are to go on next year, these appropriations will be necessary early in the session of Congress; for it is now time that preparations were being made, in order that operations be commenced so soon as the grass shall be sufficient to support the horses of the mounted troops and the animals of the trains. Our little army is not, in fact, a peace establishment; the larger portion of it is constantly in the field, or on distant frontiers, ready for the field, where it is necessarily incurring the heaviest war expenditures to maintain the efficiency required in the onerous duties it is obliged to perform. A view of the accompanying map will better show the vast

extent of territory its operations cover, than a volume written on the subject.

I have the honor to be, with high consideration and respect, sir, your obedient servant,

TH. S. JESUP,  
*Quartermaster General.*

Hon. JOHN B. FLOYD,  
*Secretary of War, Washington City.*

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No. 7.

REPORT OF THE COMMISSARY GENERAL.

OFFICE OF COMMISSARY GENERAL OF SUBSISTENCE,  
*Washington, October 31, 1857.*

SIR: I have the honor to submit the following report of the operations of this department during the fiscal year ending June 30, 1857, and to transmit an estimate for the subsistence of the army for the fiscal year ending June 30, 1859.

The principal portions of the subsistence stores procured for the army during the past year were obtained in the cities of New York, Baltimore, Charleston, New Orleans, St. Louis, and San Francisco, by advertising for bids, and accepting the lowest bids for the proper articles.

Flour for the troops in New Mexico was procured by contract, made from wheat grown in that Territory and the neighboring provinces of Mexico. On the Pacific, whenever economy would permit, this article of the ration was procured from the mills in the vicinity of the posts.

Fresh beef for the troops at the Atlantic posts, Florida, Texas, and on the Pacific, was procured by contract in their vicinity. At Forts Riley, Kearney, Laramie, and the posts on the Upper Missouri, cattle on the hoof were delivered by contract, the department grazing and feeding the cattle until they were required for use. For the troops in New Mexico, cattle on the hoof were procured in that Territory, and kept in the same manner.

Supplies for the Utah expedition were purchased in Saint Louis; three months' supply for the use of the troops on the march, and one year's supply (salt excepted) from the time of their arrival at their destination, was forwarded.

A contract was made with Messrs. Russell & Waddell for the delivery of one year's supply of cattle on the hoof to the troops in Utah. One of the herds of this firm was attacked by the Cheyennes upon the plains, and several hundred head of cattle were lost. From the high character of the gentlemen composing this firm for integrity and enterprise, no doubt exists but that every effort will be made on their part to fulfil their engagement; but to prevent a possibility of suffering to the troops for the want of fresh meat, three hundred and fifty

(350) head of cattle belonging to the department, which were at Fort Laramie, are now in progress thence with the troops.

By your instructions, tea has been introduced as a part of the ration, in part substitution for coffee; and the desiccated vegetables of Chollet & Co. have been furnished the troops on the Utah expedition as anti-scorbutics.

Every effort has been made to supply the troops with good and wholesome provisions, and, notwithstanding the wide range of their stations and frequent movements, it is believed with complete success.

The officers acting in this department have generally rendered their accounts as promptly as the nature of their service would permit, and have generally performed their duties with zeal and fidelity.

It will be seen that, in the estimate herewith submitted, the cost of the ration is estimated at twenty-six and a half (26½) cents; that of the previous estimate having been twenty-seven and a half (27½) cents.

Very respectfully, your most obedient servant,

A. E. SHIRAS,

*Captain, Acting Com. Gen. Subsistence.*

Hon. JOHN B. FLOYD,  
*Secretary of War.*

### No. 8.

#### REPORT OF THE PAYMASTER GENERAL.

##### PAYMASTER GENERAL'S OFFICE,

*November 10, 1857.*

SIR: I have the honor to submit herewith a report of the transactions of the pay department for the fiscal year ending the 30th June, 1857.

It will be seen by the tabular statement herewith that there remained in the hands of paymasters on the 30th June, 1856, applicable to payments due in the first quarter of the last fiscal year, the sum of..... \$534,450 46

In addition to which, they have received from the treasury and other sources, exclusive of amounts transferred from one to another, the sum of..... 4,466,877 82

Making a total of..... 5,001,328 28

##### Expended as follows :

Payments to regular troops..... \$4,150,337 08

Payments to volunteers..... 365,617 38

In paying the Military Academy..... 94,505 26

4,610,459 72

Leaving a balance to be accounted for of..... 390,868 56

This balance has generally been expended and accounted for since the commencement of the present fiscal year.

The great extent of our frontier, and the disturbed condition of our Indian relations, have greatly increased the labor and responsibility of paymasters; and it is due to them to say, that they have made every effort to insure the payment of the troops according to law; but in a few instances this has been impracticable, from causes over which they had no control.

I regret to state that Major Dashiell reports that, while crossing the bar at the mouth of Indian river, Florida, his boat was capsized by the surf, and the amount of public funds in his possession, (\$23,115,) for the payment of the troops in that part of Florida, was lost, and every effort to recover it has proved unavailing. I trust he will find no difficulty in obtaining relief from Congress.

The law of the 3d March last, amending the sub-treasury law, with the instructions of the Secretary of the Treasury to the assistant treasurers, caused disbursing officers much inconvenience, until relieved by your circular of the 14th September last, and, if rigidly adhered to, would render our disbursements impracticable. I trust Congress will, at an early period, so modify it as to remove all difficulties in carrying out its provisions.

I have the honor to be, very respectfully, your obedient servant,

BENJ. F. LARNED,

*Paymaster General.*

Hon. J. B. FLOYD,

*Secretary of War.*

Statement showing the amount remaining in the hands of each of the disbursing officers of the pay department and unaccounted for on the 1st of July, 1856; the amount remitted to each from the treasury or turned over by other agents during the fiscal year ending June 30, 1857; the amount accounted for by accounts and vouchers of expenditure, or by transfer or replacements in the treasury, and the balance unaccounted for, to be applied to payments in the first quarter of the next fiscal year.

Paymasters.	Balances in hand and unaccounted for 1st July, 1856.	Remitted from treasury and turned over by other agents in the year ending 30th June, 1857.	Total amount received and to be accounted for.	Amount expended in paying regular troops	Amount expended in paying volunteers.	Amount expended in paying the Military Academy.	Amount turned over to other agents or replaced in the treasury.	Total am't accounted for.	Balances unexpended, to be applied to payments in next fiscal year.
T. P. Andrews, deputy paymaster general.....	\$80,564 42	\$357,323 11	\$437,887 53	\$228,455 10	.....	.....	\$209,432 43	\$437,887 53	.....
E. Van Ness.....do.....	40,707 11	168,514 12	209,221 23	38,900 54	.....	.....	169,874 27	209,221 23	.....
T. J. Leslie.....	10,615 98	472,143 82	482,759 80	468,685 50	6,612 88	.....	5,755 47	481,053 85	\$21,705 95
St. Clair Donny.....	10,964 76	153,588 81	164,553 57	126,369 59	254 51	.....	2,795 00	129,419 10	35,134 47
David Hunter.....	12,324 81	85,332 15	97,656 96	21,679 02	.....	.....	58,035 71	79,714 73	17,942 23
L. J. Beall.....	3,190 46	197,968 56	201,157 02	159,996 67	292 21	.....	38,965 30	199,254 18	1,902 84
A. J. Coffee.....	12,742 42	185,033 73	197,776 15	175,220 18	1,601 97	.....	11,887 30	188,709 45	9,066 70
G. H. Ringgold.....	17,609 45	125,814 56	143,424 01	130,802 59	.....	.....	5,000 00	135,802 59	7,621 42
Henry Hill.....	66 23	471,904 32	471,970 55	305,312 83	1,461 89	\$90,820 54	74,372 86	471,968 12	2 43
R. B. Reynolds.....	11,634 25	162,898 25	174,532 50	101,095 21	853 08	.....	61,349 07	163,297 36	11,235 14
J. Y. Dashiell.....	6,029 70	171,611 40	177,641 10	134,265 09	147 46	.....	.....	134,412 55	43,228 55
S. Maclin.....	853 82	66,092 05	66,945 87	65,974 60	.....	.....	653 45	66,628 05	317 82
A. W. Gaines.....	50,846 32	186,624 33	237,470 65	166,070 31	.....	.....	32,671 20	198,741 51	38,729 14
A. G. Bennett*.....	1,281 80	.....	1,281 80	992 00	.....	.....	.....	992 00	289 80
Hiram Leonard.....	4,844 05	353,294 21	358,138 26	183,952 03	103,196 12	.....	52,433 74	339,581 89	18,556 37
F. A. Cunningham.....	41,152 80	44,537 56	85,690 36	42,947 17	110 01	.....	41,929 10	84,986 28	704 08
George O. Hutter.....	21,663 27	110,146 45	131,809 72	121,712 37	31 26	.....	241 26	121,984 89	9,824 83
A. J. Smith.....	100,370 42	215,849 37	316,219 79	195,891 42	103,147 06	.....	6,770 04	305,808 52	10,411 27
N. W. Brown.....	12,912 74	562,205 23	575,117 97	353,836 57	145,334 94	3,684 72	72,261 74	575,117 97	.....
J. R. Hagner†.....	1,270 01	70,135 76	71,405 77	44,220 34	.....	.....	27,185 43	71,405 77	.....
B. W. Brice.....	12,298 45	160,745 53	173,043 98	170,685 38	.....	.....	1,246 20	171,931 58	1,112 40
Oary H. Fry.....	9,591 40	278,291 09	287,882 49	63,942 06	.....	.....	195,009 41	258,951 47	28,931 02
Benj. Alvoord.....	20,443 37	355,885 78	376,329 15	328,151 45	2,004 57	.....	22,000 00	352,156 02	24,173 13
R. H. Chilton.....	35,893 10	208,770 57	247,663 67	211,547 29	.....	.....	26,806 27	238,353 56	9,310 11
F. E. Hunt.....	870 52	254,181 97	255,052 49	150,480 43	.....	.....	.....	150,480 43	104,572 06
Henry Prince.....	10,708 80	108,612 34	119,321 14	107,844 38	.....	.....	.....	107,844 38	11,476 76
Samuel Woods.....	.....	53,550 00	53,550 00	51,306 96	123 00	.....	.....	51,429 96	2,120 04
A. B. Ragan.....	.....	2,500 00	2,500 00	.....	.....	.....	.....	.....	2,500 00
	534,450 46	5,583,553 07	6,118,003 53	4,150,337 08	385,617 38	94,505 26	1,116,675 25	5,727,134 97	390,868 56

\* Dead.

† Died December 6, 1856.

No. 9.—REPORT OF THE SURGEON GENERAL.

SURGEON GENERAL'S OFFICE,  
November 10, 1857.

SIR: I have the honor to submit to you the usual financial report of the medical department of the army, together with a tabular statement of the sick and wounded of the army for the year ending on the 30th June, 1857.

The amount of the regular appropriation for the medical and hospital department of the army which remained on the 30th June, 1856, was—

In the hands of disbursing agents.....	\$2,151 62		
In the treasury of the United States .....	3,601 13		
Amount appropriated per act of August 30, 1856, for the current expenses of the medical and hospital department for the year ending June 30, 1857 .....	75,000 00	\$80,752 75	
<i>Additional appropriations.</i>			
Amount re-appropriated per act of March 3, 1857, to restore a portion of the balance of a previous appropriation which had, by law, reverted to the surplus fund of the treasury.....	50,000 00		
Amount appropriated per act of March 3, 1857, for the pay of cooks and nurses in the military hospitals.....	25,000 00		
Amount transferred by the Secretary of War from the appropriation for raising four new regiments .....	20,000 00		
Amount refunded to the treasury by sundry persons to the credit of the medical department .....	152 20		
		95,152 20	
Of the foregoing sums there has been expended—			\$175,904 95
On account of pay and other claims of private physicians contracted in.....1848	235 29		
Do.....do.....1850	9 75		
Do.....do.....1851	501 00		
Do.....do.....1852	203 76		
Do.....do.....1853	454 50		
Do.....do.....1854	85 91		
Do.....do.....1855	684 81		
Do.....do.....1856	7,821 76		
Do.....do.....1857	7,553 39		
		17,550 17	
On account of medical and hospital supplies, &c., &c., &c.....1847	67 32		
Do.....do.....1848	41 00		
Do.....do.....1850	5 50		
Do.....do.....1851	12 78		
Do.....do.....1853	9 90		
Do.....do.....1854	214 43		
Do.....do.....1855	6 00		
Do.....do.....1856	28,499 35		
Do.....do.....1857	54,354 48		
		83,210 76	
Leaving in the hands of disbursing agents.....		9,666 77	
In the treasury of the United States .....		65,477 25	
			175,904 95



It is proper to state here, that while the amount appropriated per act of March 3, 1857, for pay of cooks and nurses in the military hospitals is acknowledged, no report of expenditures from that appropriation is given, and this for the reason that the accounts of disbursements under that head have not come in, and consequently no positive statement, or approximation thereto, of the amount paid out can be put forth.

From the foregoing tabular statement it will appear that of all the sums of money placed to the credit of the medical department of the army, seventeen thousand five hundred and fifty dollars and seventeen cents have been expended in the payment of claims of private physicians for professional services, &c., rendered through several years, to officers and soldiers of the army. And on account of medical and hospital supplies eighty-three thousand two hundred and ten dollars and seventy-six cents, leaving in the hands of disbursing agents nine thousand six hundred and sixty-six dollars and seventy-seven cents, and in the treasury of the United States sixty-five thousand four hundred and seventy-seven dollars and twenty-five cents, less the amount paid to cooks and nurses not yet reported.

The tabular statement of the sick and wounded of the army for the year ending June 30, 1857, compiled from the reports of the medical officers serving at the various military posts and with troops in the field, is herewith transmitted, and will give the following statistical results.

There were 1,026 officers and enlisted men remaining on the sick report on the 30th of June, 1856, (502 sick and 524 convalescents,) and during the succeeding twelve months there occurred 35,779 cases of wounds and disease, making an aggregate of 36,805 cases treated during the year ending June 30, 1857. Of this number 35,403 were returned to duty, 22 were placed on furlough, 319 were discharged from the service, 43 deserted, and 172 died; leaving 424 sick and 422 convalescents; in all, 846 were still under medical treatment.

From the returns in this office it appears that the mean strength of the army for the year ending June 30, 1857, was 12,701, and there having occurred during the year 35,779 cases of disease, it will appear that the proportion of cases of disease to the number of officers and enlisted men was 2.81 to 1; on an average each individual was sick or wounded two and four-fifth times. As the number of deaths reported amount to 172, it appears that the ratio of deaths to the number of men in the army (12,701) was as 1 to 73.84, and the proportion of deaths to the aggregate number of cases of disease treated (36,805) as 1 to 213.98.

The statistical report on the sickness and mortality in the army of the United States, embracing a period of sixteen years, from January, 1839, to January, 1855, which was set forth in my last annual report as completed, has since been distributed largely to numerous scientific institutes and individuals throughout this country, and to some extent in Europe; and as far as we can judge from complimentary letters received, and other notices, the publication has been very favorably received by the professional public both of this country and in Europe.

Meteorological observations have been regularly, as heretofore, taken

at the various military stations of the United States, and will constitute the basis of another publication some years hence from this bureau, on the science of meteorology, &c., &c.

Since the period of my last annual report two army medical boards have been convened for the examination of candidates for admission into the medical department of the army, one at St. Louis, Missouri, and the other in the city of New York.

Before the first board nineteen candidates were invited to appear for examination.

Of the whole number invited eighteen presented themselves for examination, and of those who were present, one being physically defective, he was not admitted to a professional examination, five having failed under a partial examination were permitted to withdraw, twelve having been fully examined were rejected, and two only passed the ordeal in safety.

Before the second board, in the city of New York, 27 were invited to appear, and 26 of them did appear for examination.

Of the number who were present one was found physically defective, and consequently not admitted to a professional examination, eleven failing on a partial examination were permitted to withdraw, ten were fully examined and rejected, and five were approved and recommended for appointment to the army.

Before this board two assistant surgeons of the army were also examined, and both having come up to the standard of professional merit required, they were recommended for promotion in the medical corps of the army.

Of the medical officers of the army, one hundred and five in number, two were on the sick report, perhaps permanently disabled, and two were on ordinary leave of absence, and all the others on duty on the 30th of June last.

The medical corps of the army, though comparatively large for the strength of the army, is nevertheless not sufficient to meet the requirements of the military service, divided and subdivided as the army now is, and dispersed all over the land from the Atlantic to the Pacific ocean, and from the line of the ocean to the Lake of the Woods.

There are at this time thirty-seven private physicians necessarily employed, and it is the average number of employés throughout the year.

It may be well to observe that I am not asking for an increase or recommending an enlargement of the corps, but simply stating a fact upon which other and higher authority can act understandingly in the premises; that is, decide whether it is better to consolidate the troops and bring them within the reach of army medical officers, or carry the strength of the medical corps to the number of military posts occupied by troops, and to the number of detached bodies of troops on a line of march or operating in the field.

All of which is respectfully submitted,

TH. LAWSON, *Surg. Genl.*

Hon. J. B. FLOYD,

*Secretary of War.*

## No. 10.

## REPORT OF THE CHIEF ENGINEER.

ENGINEER DEPARTMENT,  
Washington, November 24, 1857.

SIR: I have the honor to submit the following annual report on the progress and condition of those branches of the military service committed to the care of this department.

*Fortifications on the seaboard and northern frontier.*—Referring to the special reports which follow for the condition of the respective works, I take pleasure in stating that much has been done during the past year toward increasing the general efficiency of our defences, and that the officers to whose charge the conduct of the constructions has been confided have executed their trusts in the usual satisfactory manner.

The liberal appropriations for fortifications granted by Congress at the last session not having been available till the 1st of July last, have been but in small part applied; but when expended, as they may mostly be by the end of the fiscal year, they will add largely to the security of our sea-coast frontier.

The new works provided for by the last Congress will be commenced during the year, and pushed forward as rapidly as practicable to the extent of the appropriation.

While looking with interest to the speedy completion of our system of defences, I am constrained, under the instructions given by you in view of the probable necessity for retrenchment in the expenditures of the government for the next year, to reduce the estimates far below what might be advantageously applied, or what it would otherwise be desirable should be granted.

*Fort Mackinac, Michigan.*—This old fort remains in the very dilapidated condition reported last year. Considerable repairs are indispensable, the cost of which has been estimated by an officer who has recently inspected the work at \$9,000.

*Fort Wayne, Detroit, Michigan, in charge of Lieutenant C. E. Blunt.*—This work is generally in good condition as regards its defences, but portions of the timber revetments of the scarp require repairs. As annual expenditure for this purpose will be necessary, in consequence of the constant decay of the perishable materials constituting the revetment, it would be true economy, besides adding to the strength of the work, to erect a stone scarp without further delay, for which an appropriation of \$50,000 is asked for the next fiscal year.

*Fort Porter, near Buffalo, New York, in charge of Lieutenant C. E. Blunt.*—This work has been thoroughly repaired during the past year, and is now in good condition. No appropriation is asked.

*Fort Niagara, Niagara river, New York, in charge of Lieutenant C. E. Blunt.*—Some repairs and renewals are needed here, the principal of which is the substitution, as at Fort Wayne, of a suitable stone scarp for the present timber revetment. The cribs that have been placed along the shores of the lake and river during the last few years continue to serve a good purpose in protecting the site, but they should be added to, in order to a more perfect and extensive effect. For these objects an appropriation of \$50,000 is asked for the coming fiscal year.

*Fort Ontario, Oswego, New York, in charge of Lieutenant C. E. Blunt.*—Nothing has been done at this work during the year for want of means. The decay of the timber scarp and gun platforms, already reported more than once, is still going on, and the necessity for yearly expenditures on this account can only be prevented by the erection of a permanent scarp of masonry and the substitution of stone platforms for the present imperfect wooden ones. Some other and minor repairs are also urgently required to perfect the defences; and for these purposes an appropriation of \$50,000 is asked for the year.

*Fort Montgomery, Rouse's Point, New York, in charge of Lieutenant C. E. Blunt.*—The counterscarp has been completed, a solid sub-foundation laid for the guard-house, and a considerable addition made to the embankment of the cover-face. The scarp, piers, magazine walls, and arches of the northern bastion, have been finished, with the exception of a few yards of scarp near the salient. Seven iron and concrete embrasure linings have been put in this bastion. The masonry of the lower story of the eastern bastion (including lower arches) and of the lower story of the adjacent circular stairway has been completed, and the scarp of the faces carried up to the cordon. A considerable stock of materials has been purchased for next season's work.

Balance in treasury October 1, 1857.....	\$14,000 00
Probable amount to be expended by June 30, 1858.....	14,000 00
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	50,000 00

*Fort Knox, Narrows of Penobscot, Maine, in charge of Captain John D. Kurtz.*—The year's work embraces the completion of the front walls of the reverse fires of the ditches, the coping of the counterscarp, roofing of its galleries and casemates, embanking terrepleins and glacis, the construction of the scarp of water-fronts, including the gun embrasures and main gateway to a height of about ten feet above the casemate floors, laying foundations of south scarp and adjacent magazines, building about two-thirds of the barrack area wall, and more than half the retaining wall of the entrance ramp, putting down platforms for a part of the heavy guns in the north covered way, and laying the foundation of the breast-height wall in front of them. A shot furnace has also been constructed in battery A, the foundations of another put down in battery B, and the cistern under the south casemate of the main work built.

The next year's work will embrace the continuation of the scarp, the construction of the north covered way, completion of furnace in battery B, building piers and arches of gun rooms and magazines, forming terrepleins, and embanking glacis and slopes.

Balance in treasury October 1, 1857.....	\$26,500 60
Probable amount to be expended by June 30, 1857.....	26,500 60
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	50,000 00

*Fort Preble, Portland harbor, Maine, in charge of Captain John D. Kurtz.*—Repairs of the defences and buildings at this post were executed to some extent during the year. The breast-heights were pointed and repaired, banquetts, gun platforms, scarp, furnaces, parade walls, and magazines put in order; portcullis machinery adjusted; wharf slightly repaired; plastering of buildings patched; outside wood work painted; cisterns and pipes put in order; fencing renewed in part; some pavements relaid; roofs repaired, and various other small repairs executed. The coming season it is expected that provision for a heavier armament will be made. No further appropriation is asked.

*Fort Scammel, Portland harbor, Maine, in charge of Captain John D. Kurtz.*—Nothing beyond cultivating the grassed surfaces has been done during the year. Next season it is proposed to complete the unfinished parapet, and provide for changes in the armament of the work, but no additional appropriation for these objects is asked.

Balance in treasury October 1, 1857.....	\$2,284 51
Probable amount to be expended by June 30, 1858.....	2,284 51

*Fort Constitution, Portsmouth harbor, New Hampshire, in charge of Captain John D. Kurtz.*—The cultivation of the grassed surfaces has been attended to during the growing season. Next year it is expected to provide for some changes in the armament of the work, which it is designed to do out of the general grant for this purpose. No appropriation is asked.

*Fort McClary, Portsmouth harbor, New Hampshire, in charge of Captain John D. Kurtz.*—The fort has been in care of fort keeper during the year. No operations have been undertaken, and no appropriation is asked for next year.

*Fortifications near mouth of Kennebec river, Maine.*—At the last session of Congress an appropriation of \$100,000 was made for the purpose of commencing fortifications for the mouth of this river. As soon as the plans, now being prepared by the board of engineers, are completed, and other requisite preliminary arrangements made, active operations of construction will be commenced.

Balance in treasury October 1, 1857.....	\$99,500 00
Probable amount to be expended by June 30, 1858.....	50,000 00
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	25,000 00

*Fort on Hog Island ledge, Portland harbor, Maine.*—At the last session of Congress an appropriation of \$50,000 was made for this locality. There will be no unnecessary delay in beginning this important work on the completion of the plan by the board of engineers, which has it now in hand.

Balance in treasury October 1, 1857 .....	\$49,500 00
Probable amount to be expended by 30th June, 1858.....	49,500 00
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	50,000 00

*Fort Winthrop, Boston harbor, Massachusetts, in charge of Captain H. W. Benham until July, since then of Lieutenant C. S. Stewart.*—The scarp wall throughout fronts Nos. 3 and 4, a distance of 247', has been raised 6' 8", to a height of 32' 4" above the foundations. The parade wall on Nos. 3 and 4 has been built from its foundation to its coping, a height of 28' 4". On front No. 1 it has been raised 23'; on front No. 2 to the level of the third story, or 11' 6" in height. The stairway has been built 11' higher. All the remaining piers and arches of the basement and second story have been put up; also, one-half of the piers and arches of the third story.

Balance in treasury October 1, 1857 .....	\$21,000 00
Probable amount to be expended by June 30, 1858.....	21,000 00
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	30,000 00

*Fort Warren, Boston harbor, Massachusetts, in charge of Lieutenant C. S. Stewart.*—The breast-height wall of curtain front No. 2 has been put up for a length of 245 feet, completing the breast-height wall of the main work and its batteries. Thirteen pintle stones for the barbette guns have been put down on curtain front No. 2. These bear on the main channel; and now pintle stones for all the guns of the main work, bearing directly on the main channel, are in position.

All the finish has been completed in the casemate rooms for soldiers' quarters, each 50 by 17 feet, in curtain front No. 2. The finish has been very nearly completed in ten other casemate rooms for soldiers' quarters on front No. 1, each 29' by 17'.

On curtain front No. 3 the finish has been put up in seven large rooms with fireplaces, and six smaller without, for officers' quarters; also, in part, in twenty-six large rooms with, and nineteen smaller without, fireplaces. Twenty-six other rooms have been made about ready for the plasterer. The partitions, &c., of twenty rooms for quarters and of one store-room have been put up; also, the brick linings of two service magazines, one on front No. 1, the other on front No. 2.

Balance in treasury October 1, 1857.....	\$10,674 22
Probable amount to be expended by 30th June, 1858.....	10,674 22
Estimate of amount required to be appropriated for the fiscal year ending 30th June, 1859.....	30,000 00

*Fort Independence, Boston harbor, Massachusetts, in charge of Captain H. W. Benham until July, since then of Lieutenant C. S. Stewart.*—Owing to the presence of a garrison at this work, occupying all the quarters until quite recently, nothing has been done the present season. It is believed that the amount appropriated already will be sufficient for the contemplated repairs, and therefore nothing further is now asked.

*Fort at entrance to New Bedford harbor, Massachusetts, in charge of Captain H. W. Benham.*—At the last session of Congress an appropriation of \$150,000 was made for a fort to be erected at the entrance of this harbor. A large portion of this appropriation has been expended in the purchase of the site; the balance will be applicable to the preliminary measures and the commencement of the work next spring. The survey of the locality is complete; the plans have been long ready.

Balance in treasury October 1, 1857.....	\$70,500 00
Probable amount to be expended by June 30, 1858.....	70,500 00

*Fort Adams, Newport harbor, Rhode Island, in charge of Lieutenant E. B. Hunt.*—The chief operations during the past year at this work, aside from ordinary repairs, have been the application of oakum, saturated with mineral tar, for pointing the cordon and coping of the west and north fronts; the repairing of 5,412 running feet of breast-height wall, and the construction of the same extent of salt marsh sod breast-height slopes. It is important that the southwest break-water should be rebuilt, and that the permanent wharf should be paved.

Balance in treasury October 1, 1857.....	\$8,009 00
Probable amount to be expended by June 30, 1858.....	8,009 00
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	35,000 00

*Forts Griswold and Trumbull, New London harbor, Connecticut; in charge of Brevet Major J. G. Barnard.*

*Battery at Fort Griswold.*—Nothing has been done on this work, which is in good order, and ready for its armament.

*Fort Trumbull.*—This fort, which has been kept in excellent condition by the labors of a very efficient fort keeper, needs only the platforms in its west exterior battery to be ready for all its armament.

*Fort at Willett's Point, opposite Fort Schuyler, New York.*—To complete the purchase of the site of this fort, cover the expense of an accurate survey of the ground, and permit a commencement of the fort itself during the next fiscal year, an appropriation of \$100,000 will be necessary.

Balance in treasury October 1, 1857.....	\$32,000 00
Probable amount to be expended by June 30, 1858.....	32,000 00
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	100,000 00



*Fort Schuylér, East river, New York, in charge of Brevet Major J. G. Barnard.*—The sea-wall, throughout its exposed portion on the north and east, of 1,200 feet in length, has been thoroughly repaired and raised by an additional coping course 2 feet thick. All the rest of the wall has been repointed and repaired where necessary.

A large portion of the masonry of the work has been pointed. A building for guard house and prison has been built over the exterior redoubt. The wood work of the quarters, casemates, gates, and posterns, and the iron work of balconies, have been painted. Wooden houses have been built over the stair towers.

The asphalting of the floors of casmates in the cover-face is in progress, and will be complete this season. The amount remaining available will be applied to completing all unfinished work of the above, and, next season, in altering the barbette platforms and repairing roofing of arches, &c.

Balance in treasury October 1, 1857.....	\$27,499 56
Probable amount to be expended by June 30, 1858.....	27,499 56

*Fort Wood and sea-wall of Bedlow's island, New York harbor, in charge of Brevet Major J. G. Barnard.*—The season's operations have been confined to procuring stone to complete the coping of the scarp. The work remaining yet to be done consists in the completion of the sea-wall, and altering the barbette platforms, grading the glacis and terrepleins of the exterior battery, construction of new bridges and drawbridges, &c.

Balance in treasury October 1, 1857.....	\$3,000 00
Probable amount to be expended by June 30, 1858.....	3,000 00
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	20,000 00

*Governor's island, New York harbor, in charge of Brevet Major J. G. Barnard.*—Construction and repairs of barracks, quarters, and hospital at Fort Columbus.—The unfinished block of officers quarters has been completed and turned over for occupation; the hospital thoroughly overhauled and placed in perfect repair, and painted; the east barracks, Fort Columbus, altered according to plans, and all remaining repairs on the other buildings done, and the painting of the whole commenced, and will be completed this season.

The soldiers' barracks of the south battery have undergone some slight repairs. No further appropriation asked.

*Repairs of Fort Columbus and Castle Williams.*—Towards these repairs no other work has been done than the fitting up of the light and dark prisons in the east building, Fort Columbus, and making a survey of the shore of the island, preparatory to building a sea-wall.

These works require their barbette platforms altered for the new armament, and Castle Williams requires new balconies.

Balance in treasury October 1, 1857.....	\$2,976 09
Probable amount to be expended by June 30, 1858.....	2,976 09
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	6,000 00

*Fort Hamilton, New York harbor, in charge of Brevet Major J. G. Barnard.*—A new permanent wharf has been commenced, and most of the piers set, and the structure will be nearly or quite completed this season; small repairs have been made on the redoubt and main work.

Balance in treasury October 1, 1857.....	\$10,000 00
Probable amount to be expended by June 30, 1858.....	10,000 00

*Fort Lafayette, New York harbor, in charge of Brevet Major J. G. Barnard.*—Nothing has been done at this work except to make some necessary repairs of small magnitude to the sea-wall.

Balance in treasury October 1, 1857.....	\$10,000 00
Probable amount to be expended by June 30, 1858.....	10,000 00

*Fort Richmond, Staten Island, New York harbor, in charge of Brevet Major J. G. Barnard.*—The operations in progress at the date of the last annual report were actively prosecuted. The scarp of the north curtain, including the construction of the embrasures of the second and third tiers, has been carried from reference (25' 10½") to (45' 11"), and the scarp of the east and south curtains, including the construction of the embrasures of the second tier, and the setting of the sills and embrasure irons for the greater part of the third tier, from reference (23' 4") to (40' 9"). The pan-coupés of the north and east channel bastions have been arranged; the gun embrasures and howitzer embrasures for the second tier constructed, and the masonry carried to reference (36' 10"). All the communication and main casemate arches of the second tier, including those of the north channel and north gorge bastions have been turned, and those of the east channel and south gorge bastions commenced. The masonry of the service magazine for the second tier has also been completed, and a portion of the granite flagging in the gun room recesses set.

Balance in treasury October 1, 1857.....	\$118,169 97
Probable amount to be expended by June 30, 1858.....	118,169 97
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	100,000 00

*Fort Tompkins, Staten Island, New York.*—The appropriation of \$150,000, made at the late session of Congress, for the erection of a work on the site of this old fort, will permit a good beginning to be made in the reconstruction, as soon as the plans can be perfected by the board of engineers.

The appropriation of \$42,300, made for the purchase of an extension of the site, the acquisition of which has for many years been recommended as indispensable to the security of the rear of this and the other works of defence on Staten Island, has been thus applied, and the United States has now the title to this important position.

Balance in treasury October 1, 1857.....	\$150,000 00
Probable amount to be expended by June 30, 1858.....	100,000 00

*Batteries Hudson and Morton, Staten Island, New York.*—These batteries are in good condition. No further appropriation is asked.

*Fortifications at Sandy Hook, New Jersey, outlet of New York harbor.*—The necessary steps have been taken preliminary to commencing the construction of the work at this highly important position, for which Congress at its last session made an appropriation of \$250,000, which sum will suffice for the commencement of operations next year.

Balance in treasury October 1, 1857 .....	\$230,000 00
Probable amount to be expended by June 30, 1858.....	130,000 00

*Fort Mifflin, Delaware river, in charge of Brevet Major John Sanders.*—This work, though in a state of general efficiency, needs some repairs; they are not so pressing, however, but they may be postponed another year.

*Fort Delaware, Delaware river, in charge of Brevet Major John Sanders.*—The face of the scarp from bastion (5—1) to the officers' quarters on front (3,) now of irregular heights, will be carried up to the cordon course before the close of fall operations, and all the casemates in rear of this part of the scarp will also be covered in and their roof surfaces partially formed. The stair towers (1—2) and (2—3) will be completed. The quarters and barracks are now carried above the sills of the second story windows. The permanent gateway and postern have been advanced but little during the year, but will be pushed to completion as soon as practicable. All the embrasure irons required for the work have been procured, those of the lower and part of those of the upper tier have been set, leaving only 17 sets to be still put in place.

The funds still unexpended will suffice to cover in bastions (5—1,) (3—4,) and (4—5,) and to raise the whole scarp, except that of curtain (5,) to the cordon reference. An appropriation of \$250,000 is asked for by the officer in charge, which would, he thinks, bring the main work to such a state of completion as to prepare it for the reception of its armament; but, in consequence of the necessity of restricting the general estimates, I am compelled to reduce this to \$100,000.

The sites for batteries on either shore, to afford the requisite cross fires with the fort for the more perfect defence of the channel of the river, are yet to be provided.

Balance in treasury October 1, 1857 .....	\$115,000 00
Probable amount to be expended by June 30, 1858.....	115,000 00
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	100,000 00

*Fort Carroll, Soller's Point Flats, Baltimore harbor, in charge of Major H. Brewerton.*—The piling of the foundation has been completed, and the piles sawed off on fronts 2, 3, and 4. The grillage has been completed on fronts 3 and 4; and on front 2, the whole of the lower course of timber of the grillage, three-fourths of the upper course, and about one-fourth of the 6-inch planking have been laid. The opening left in front 5 has been closed and the sea-wall completed, as has also the eighth course of the scarp wall. The exterior of the ninth course of scarp has been laid, with the exception of about five-sixths of front 2. The interior of the ninth course has been laid on front 3, and 200 feet on front 4. The exterior of tenth course has

been laid on front 3 and part of front 4, together with 200 running feet of the interior of the same course on the latter front. The foundations of six of the piers on front 3, and eight on front 4, have been raised one foot six inches above the top of the grillage. Fifty-two thousand three hundred and nineteen cubic yards of sand have been taken from the bed of the river and placed within the area of the fort, making the whole quantity of filling, to include the 30th September, 85,561 cubic yards. An artesian well, for the purpose of procuring a supply of pure, fresh water, was commenced in March last, and iron pipes (20 inches in diameter,) have been sunk to the depth of about 109 feet below the plane of ordinary low water. The permanent wharf has been commenced, and it is hoped to sink the wooden portion in place this year.

Balance in treasury October 1, 1857 .....	\$155,505 48
Probable amount to be expended by June 30, 1858.....	155,505 48
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	100,000 00

*Fort Madison, Annapolis harbor, Maryland, in charge of Captain M. C. Meigs.*—An appropriation towards the completion of this fort was made at the last session, but the plans having been destroyed by fire no operations of construction could be undertaken till a survey and a plan of the ground and work were made. This is now in hand, and will be completed so as to allow the commencement of work early next season. The work has been in care of a fort keeper, who reports all in good condition.

*Fort Washington, Potomac river, Maryland.*—This fort continues in good condition, and has required no work except in some repairs of the wharf. These have been made.

*Fort Monroe, Old Point Comfort, Virginia, in charge of Brevet Col. John L. Smith.*—The magazines of front No. 6 are nearly finished. Old and defective pipes have been removed and new pipes have been laid for the drainage of the roofs of fronts No. 1 and No. 2, and of the roofs of the caps de garde, and of the magazines of front No. 5. The masons have been engaged mostly in re-pointing the masonry of the exterior of the casemates. The counterscarp at the sluice, near the batardeau, that had been undermined during a gale some years ago, is nearly rebuilt, with piles and a bedding of béton to support the foundations. Extensive repairs have been made to the gutters of the roof of the water battery in advance of front No. 4. Nothing has been done to the redoubt.

The pierhead of the permanent wharf has been finished. Its stability was thoroughly tested during the ice period, of three weeks duration, in January and February last. The bridge between the pierhead and shore needs immediate temporary repair to render it safe. The wharf is an indispensable appendage to Fort Monroe. The bridge ought to be rebuilt without delay, and in a permanent manner.

Balance in treasury October 1, 1857.....	\$31,000 00
Probable amount to be expended by June 30, 1858.....	31,000 00

*Artesian well at Fort Monroe, Old Point Comfort, Virginia.*—No offers have been received for sinking the artesian well by contract, although they were advertised at many places.

Balance in treasury October 1, 1857..... \$10,000 00

*Bridge over Mill creek, Old Point Comfort, Virginia.*—The appropriation of \$800 made at the last session for the repairs of this bridge, forming the sole communication between Fort Monroe and Hampton, will be applied to such indispensable renewals as can be effected with that sum. These, it is hoped, will put the bridge in a serviceable condition for another year, and therefore no further appropriation is now asked.

*Fort Calhoun, Hampton Roads, Virginia, in charge of Brevet Colonel John L. Smith.*—The construction of this work is about to be commenced, and a contract has been concluded for the stone for the lower courses, the delivery of which is to commence in November. The removal of the loading was completed in May last. Much labor has been expended in removing obstacles to admit of the measurement of the old masonry; also in handling red sandstone to make necessary measurements; also in loading the spaces to be occupied by stairways, &c. The old walls have been removed, to some extent, where the magistral course of the scarp and the base courses of the piers are to be laid; and the bedding for these courses has been prepared nearly to the extent of the removal. The new wharf will be in a condition for receiving the stone contracted for when it may be delivered.

Balance in treasury October 1, 1857..... \$146,048 00  
 Probable amount to be expended by June 30, 1858..... 146,048 00  
 Estimate of amount required to be appropriated for the  
 fiscal year ending June 30, 1859..... 100,000 00

*Fort Macon and preservation of its site, Beaufort harbor, North Carolina, in charge of Lieutenant W. H. C. Whiting until July 2, 1857, since then of Captain G. W. Cullum.*—The condition of the work is, generally, very good, except the shingling of the interior slopes of the covered way and the iron work, which requires thorough lackering. The jettys require considerable repairs for the efficient protection of the site. They were cut off from the beach, to which they should be thoroughly re-united, by the August gale of 1856, and the greater storm of 1857.

Balance in treasury October 1, 1857..... \$600 00  
 Probable amount to be expended by June 30, 1858..... 600 00  
 Estimate of amount required to be appropriated for the  
 fiscal year ending June 30, 1859..... 10,000 00

*Fort Caswell and preservation of its site, Smithville, North Carolina, in charge of Lieutenant W. H. C. Whiting until July 2, 1857, since then of Captain G. W. Cullum.*—Nothing has been done at this work during the past year. The masonry, generally, is in good condition,

though some pointing should be renewed and a few trifling leaks stopped ; a new shot furnace is required or the old one should be repaired ; the parapets, terrepleins, and glacis are considerably cut up by cattle, which cannot be excluded without erecting a substantial fence exterior to the site of the fort ; the shingled slopes are much, and the permanent parts of the bridges partially, decayed ; the quarters within the keep or citadel require some repairs and thorough painting and white-washing ; the water gate should be re-adjusted ; the wharf, now useless by the making out of the beach, wants extension, and many minor details require attention.

Owing to the shifting of the channel into Cape Fear river, from the east to the west bank, additional platforms for guns will be wanted upon the gorge of the main work, and upon the right flank and gorge of the covered way.

Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	\$10,000 00
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*Repairs of Fort Moultrie, Charleston harbor, South Carolina, in charge of Captain G. W. Cullum.*—Nothing has been done at this work during the past year, except procuring the cut granite for the columbiad platforms, designed to take the place of lighter guns now on the channel fronts of the fort.

*Preservation of the site of Fort Moultrie, Charleston harbor, South Carolina, in charge of Captain G. W. Cullum.*—The new jetty for the protection of Sullivan's island is nearly half finished, its completion having been suspended till the effect of the constructed part is determined and the sand has accumulated on the prolongation, whereby a considerable saving of stone will be effected, should further extension become necessary. The indications thus far are very favorable, the jetty having accumulated much sand and subserved the purposes for which it was built. It was originally contemplated to be 250 feet long, but it is now thought it may be safely limited to 150 feet, for which the present appropriation will be ample. I would, however, urgently recommend the thorough repairs of the existing jettys, some of which have sunk in places and others have been much damaged by severe gales for several years, during which nothing has been done to them for their preservation.

Balance in treasury October 1, 1857.....	\$6,500 00
Probable amount to be expended by June 30, 1858.....	6,500 00
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	10,000 00

*Fort Sumter, Charleston harbor, South Carolina, in charge of Captain G. W. Cullum.*—This work has been vigorously advanced during the past year, to increase its defensive efficiency and accomodation for its garrison. Twenty masonry platforms, for heavy columbiads, have been laid down, and the entire barbette, or upper battery of fifty-three guns, has been made ready for service. The whole interior of the officers' quarters has been finished in the most substantial and workmanlike



manner. The soldiers' barracks have had their fire proof floors of brick arches, turned on wrought iron beams and girders, put in; their iron stairways and mantles provided, and the interior finish completed as far as possible, till the casemate platform arches upon which they depend are built. The magazines, and their ante-rooms, have been furnished with heavy metallic doors and ventilator shutters, and are now in use for powder and fixed ammunition. The drainage of the fort has been perfected, and many minor details have received attention. A large quantity of materials are on hand for future operations.

The work remaining to be done is to construct the platform arches and embrasures for the second tier of guns, complete the parapet wall, pave the first and second tiers of casemates and parade side walks, lay the traverse rails for all the casemate guns, complete the soldiers' barracks, and a new building for a hospital and other purposes, construct additional cisterns on parade, rebuild the end of the stone wharf, point the entire masonry, and attend to various minor details.

Balance in treasury October 1, 1857 .....	\$85,000 00
Probable amount to be expended by June 30, 1858.....	85,000 00
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	25,000 00

*Preservation of the site of Fort Johnson, Charleston harbor, South Carolina, in charge of Captain G. W. Cullum.*—Since the completion of the new wharf to supply the place of the one destroyed by the September gale of 1854, nothing has been done to the repairs of the sea wall, much injured by the same storm, the small balance in hand being totally inadequate to complete any portion of the work.

Balance in treasury October 1, 1857.....	\$1,132 30
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*Repairs of quarters and barracks at Fort Johnson, Charleston harbor, South Carolina, in charge of Captain G. W. Cullum.*—These repairs, which were commenced some years since, should be completed at once. The work already done cannot be availed of for use in its incomplete state, and the buildings are suffering for want of further protection.

Estimate of amount to be appropriated for fiscal year end- ing June 3, 1859.....	\$6,000 00
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*Repairs of Castle Pinckney, Charleston harbor, South Carolina, in charge of Captain G. W. Cullum.*—The wharf at this work, destroyed by the September gale of 1854, has been rebuilt, and its stone abutment capped with heavy granite blocks; a substantial boat house put up; the entire sea-wall thoroughly repaired, and coped with large flagging stones, extending from its outer edge to the scarp wall of the castle; a new fifteen feet shot furnace substituted for the old and insufficient one on the parade; the floors and roofs of the quarters and barracks repaired, and their chimney tops rebuilt, and considerable cement, and all the asphalt pointing executed. The contemplated



repairs can readily be completed this autumn without further appropriation.

*Fort Pulaski, Savannah river, Georgia, in charge of Captain J. F. Gilmer.*—Attention at this work has been principally directed to pointing the masonry of the main work and demi-lunes, replacing decayed bricks in the arches and jambs of embrasures, and making repairs to other portions of the masonry; to clearing out and enlarging the canal which supplies the ditches with water; to excavating for the foundation of a large masonry sluice at the entrance of this canal, and constructing the coffer dam around same; to sundry minor repairs of the embankments of the fort and island; to draining and police; and to the collection of materials for further operations.

The operations contemplated at this work are: to remodel the barbette gun platforms to suit the proposed change in the armament; to complete the pointing of the masonry; to build the large sluices for supplying water to the ditches, and to remove the mud accumulated in the ditches of main work and demi-lunes.

Balance in treasury October 1, 1857 .....	\$33,300 00
Probable amount to be expended by June 30, 1858.....	33,300 00
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	10,000 00

*Repairs of Fort Jackson, Savannah river, Georgia, in charge of Captain J. F. Gilmer.*—During the year the masonry of the wharf has been carried up to the springing lines of the arch over the sluice passing through its centre; the masonry of the dyke walls adjacent to the wharf built to full height; the timber braces across the bottom of the ditch, along the river fronts, have been put down, and a flooring of three-inch plank laid on them, to retain the water in the ditch at low tide; the masonry of the new scarp walls has been pointed; a part of the earth which had accumulated in the ditch along the land fronts removed, and filled in between the double walls connecting the wharf and entrance to the fort; the heavy sluice gate has been framed, and materials received for the further prosecution of the repairs, and for the construction of the officers' and soldiers' quarters. The work yet to be done embraces the following operations, viz: to floor the ditch along the land fronts, and to establish platforms for the flank guns; to enclose the gorges of the half bastions, and roof the flank batteries; to build cisterns to supply water for the garrison, and culverts for drainage from the quarters and the parade; to complete the masonry of gateway, and build the interior quarters for officers and soldiers.

Balance in treasury October 1, 1857 .....	\$26,000 00
Probable amount to be expended by June 30, 1858.....	26,000 00
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	20,000 00

*Fort Clinch, entrance to Cumberland sound, Florida, in charge of Captain J. F. Gilmer until August 20; since then Lieutenant*

*W. H. C. Whiting.*—The expenditures for the past year have been applied to the completion of the scarp wall connecting the north and east bastions; excavating and laying foundations of officers' kitchens and casemates in their rear; building cisterns for officers' quarters; building galleries of communication to the north and east bastions, foundation and walls of east bastion to soles of embrasures; building curtain of land front to the reference (14;) building and finishing guard houses, foundations of south bastion and cistern, foundations of scarp wall of curtain connecting south and southwest bastions, foundations of southwest bastion, foundation of southwest and northwest curtain; building northwest bastion to the springing of the arches; partial embankments on the north, northeast, and northwest ramparts, and the rampart of the land front, and to repairing the wharf.

Balance in treasury October 1, 1857.....	\$46,000 00
Probable amount to be expended by June 30, 1858..	46,000 00
Estimate of amount required to be appropriated from the fiscal year ending June 30, 1859 .....	75,000 00

*Fort Taylor, Key West, Florida, in charge of Felix Senac, esq., Brevet Major John Sanders, and Captain D. P. Woodbury.*—The labors of the year have been applied mainly to the masonry of the second tier of guns. The casemate arches over the channel fronts of this tier have all been turned, covering 42 guns on the curtains, and 18 howitzers and 2 columbiads in the bastions. The scarp wall opposite the second tier has been raised from the level of the floor of that tier (or 20 feet above high water) to the heights of 26 feet at the gorge, 28 feet at three of the bastions, 35 feet at the fourth bastion, 28 feet throughout the north curtain, 28 feet opposite four guns on each of the west and south curtains, and 35 feet opposite the remainder of those two curtains. The southwest magazine has been raised from the same level to the height of 35 feet or the top of the covering arch, and the adjacent stairway tower to the height of 48 feet, and roofed over. Three sets of embrasure irons have been placed in the southwest bastion, and one in each of the adjoining curtains. Eighteen of the other embrasure openings on this tier have been arched over, but still require the embrasure irons and the brick work immediately around them. The piers of the gorge, four excepted, have been carried up from 21 feet to 26 feet above high water.

The balance available will be applied to the unfinished work of the first and second tiers of guns and to the barracks and magazines of the gorge.

Balance in treasury October 1, 1857 .....	\$150,000 00
Probable amount to be expended by June 30, 1858.....	150,000 00
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	100,000 00

*Fort Jefferson, Garden Key, Tortugas island, Florida, in charge of Captain D. P. Woodbury.*—The labors of the year have been devoted principally to the scarp wall, piers, magazines, and stairways of the

lower tier of casemates. The scarp wall of five of the bastions has been raised to the level of the soles of the lower embrasures, and that of the sixth bastion to the level of 9' 6" above low water. The scarp wall of five of the curtains has been raised at the embrasures to the level of 10½ feet, and between the embrasures to 14 feet above low water, with some exceptions, where it has been raised still higher. The scarp wall of the gateway front, four casemates excepted, has been raised to the level of 16½ feet above low water. On this last front the piers and communication arches of the lower tier have all been completed except two, and the casemate arches which cover the guns of this tier have all been turned. On the other five curtains the piers and communication arches have all been completed and prepared to receive the casemate arches. Three of the bastion magazines and stairway towers have been carried up to 9½ feet, and three to 16 feet above low water. The traverse stones of the lower guns have been nearly all set; 59 iron embrasures for guns and 12 for howitzers have been put in place.

The balance still available will be applied to the scarp, piers, covering arches, and all other parts of the lower tier, and will more than complete this part of the work, including all arrangements for mounting 111 guns and 35 howitzers, also 14 powder magazines in the body of the work.

Balance in treasury October 1, 1857.....	\$209,000 00
Probable amount to be expended by June 30, 1858.....	209,000 00
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	350,000 00

*Fort Barrancas, Pensacola harbor, Florida, in charge of Captain John Newton.*—The operations here have been directed principally to the advanced redoubt, of which the scarp wall all around has been carried up to the corridor; the galleries of reverse fire, the scarp galleries, the casemates of half bastions, and the stone stairs therein, have been finished; as also the masonry of the traverses and the paying of one of the subterranean galleries. The covered way is generally completed, excepting a little grading, and the grassing of the terreplein; and the glacis is as nearly finished as it can be till the parapets of the work are put on. The roofs of the interior are ready for the mastic covering.

The work yet remaining to be done comprises the completion of the parapets, terreplein, breast-height wall, gun platforms, gateway, interior wood work of magazines, and the construction of the bridges and gates of the work; also, pointing in general, paving one of the subterranean galleries, and grading, sodding and enriching the slopes of the work; a fence to enclose the work will also be needed.

At the barracks, a small amount has been expended in executing some indispensable repairs.

Balance in treasury October 1, 1857.....	\$25,333 24
Probable amount to be expended by June 30, 1858.....	25,333 24
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	27,000 00

*Fort Pickens, Pensacola harbor, Florida, in charge of Captain John Newton.*—Operations during the year have been devoted to pointing and superficial repairs of walls, cutting grass of slopes, repairing wharf after gale of August, 1856, profiling walls, and levelling the work throughout; removing gun platforms and brick terreplein from central channel bastion preparatory to repairs thereof. The arrangements for casemate fire at this work are now complete. The terreplein will need extensive repairs and remodelling to fit it for the reception of the new armament of increased calibre. Other numerous repairs are necessary in different parts of the work.

Balance in treasury October 1, 1857.....	\$11,000 00
Probable amount to be expended June 30, 1858.....	11,000 00
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	50,000 00

*Fort McKee, Pensacola harbor, Florida, in charge of Captain John Newton.*—The principal work undertaken during the last fiscal year, has been finishing repairs of interior wood work in gun casemates and quarters, gates, doors, steps, and galleries—repairs and extension of wharf after the gale of 1856. Construction of plank road for the transportation of materials from wharf to fort and battery—making temporary box jettys, renewing and repairing the same; driving pile jettys, and constructing a permanent jetty at the coupé of the fort; also repairs of walls and embrasures, and considerable work done to the magazine of the battery.

This work, so far as its casemates are concerned, is in efficient condition, and ready to receive its new armament. The barbette which is prepared for the old armament still requires the modifications necessary to adapt it for the heavier guns with which it is designed to arm it, and also extensive repairs of its terreplein to protect the casemates below from leakage. It is for these purposes, and for the further protection of its site, that the appropriation is asked.

Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	\$29,000 00
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*Fort Morgan, Mobile Point, Alabama, in charge of Captain D. Leadbetter.*—During the year two piers of the permanent wharf have been rebuilt, and the bottom between all the wharf piers has been covered with a protecting apron of concrete. The repairs of the terreplein pavement have been completed, with a view to prevent leakage through the roofs of the casemate arches. The flanking casemate guns, twenty in number, have been mounted. The modification of the breast-height wall, to receive a heavier armament on two water fronts, has been begun, and the former armament of those fronts is being dismantled.

Balance in treasury October 1, 1857.....	\$16,613 61
Probable amount to be expended by June 30, 1858.....	16,613 61
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	50,000 00

*Fort Gaines, Dauphin Island, Mobile bay, Alabama, in charge of Captain D. Leadbetter.*—During the year the permanent buildings erected by contract have been completed. Borings have been made to determine the foundations required; the site has been grubbed and cleared, the wharf rebuilt and extended a hundred feet. The excavation of the ditch has been carried down through to the reference, (3'), nearly all the excavation being embanked in the glacis. The foundations of three bastions and two curtains on the water fronts have been laid at the reference (0); the masonry of two bastions being brought up to the reference (4' 6"), and that of the other to (2'). The masonry of one curtain has been carried up to the reference (7') and of the other to nearly (2').

Balance in treasury October 1, 1857.....	\$84,600 00
Probable amount to be expended by June 30, 1858.....	84,600 00
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	50,000 00

*Fortifications for the defence of the inner passes to Mobile bay, Alabama.*—A special board of engineer officers have in hand the preparation of plans for a work at this pass, which they have not yet been able to complete.

Balance in treasury October 1, 1857.....	\$99,850 00
Probable amount to be expended by June 30, 1858.....	49,850 00

*Fortifications at Ship Island, coast of Mississippi, Mississippi.*—An examination of this locality has been made by a special board of engineer officers. The plans for the work are not yet finished, the subject being now under consideration

Balance in treasury October 1, 1857.....	\$100,000 00
Probable amount to be expended by June 30, 1858.....	50,000 00

*Défence at Proctor's Landing, Lake Borgne, Louisiana, in charge of Brevet Major P. G. T. Beauregard.*—Since the last annual report the tower has been carried up to the ref. (12'); the inner and outer ditches have been excavated and revetted; the parapets of the battery have been partly formed with a portion of the earth from the ditches; the piles of the breast-height walls, and gun platforms and circles, have been driven and loaded with the excavated earth of the ditches; the portion of the permanent quarters southeast of the passage way has been temporarily finished and fitted up for the use of the laborers on the work. The probable operations for the ensuing year will be as follows: completing the brick work of the tower; forming the parapet of the battery; completing the revetting of the inner ditch; completing the platforms of the breast-height and terreplein foundations; building the breast-height walls; laying gun traverse circles and pintle blocks; constructing bridges, &c.

Balance in treasury October 1, 1857.....	\$26,400 00
Probable amount to be expended by June 30, 1858.....	26,400 00
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	25,000 00

*Tower Dupre, Bayou Dupre, Louisiana, in charge of Lieutenant W. H. Stevens.*—This work has been in the hands of a fort keeper, and is in good order, requiring only some trifling current repairs and renovations, as white-washing, painting, &c., for which no appropriation is asked.

*Fort Macomb, Chef Menteur, Louisiana, in charge of Lieutenant W. H. Stevens.*—This work has been in care of an ordnance sergeant. The work necessary to be done is for the preservation of the site, for which a small annual grant is asked, in addition to the funds now available.

Balance in treasury October 1, 1857.....	\$6,483 11
Probable amount to be expended by June 30, 1858.....	6,483 11
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	4,000 00

*Fort Pike, Rigolets, Louisiana, in charge of Lieutenant W. H. Stevens.*—This work has been in care of an ordnance sergeant, and is in fine condition. To adapt new arrangement for drawbridge, and for placing new armament, will require a small appropriation.

Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	\$5,000 00
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*Repairs and extension of Fort St. Philip, Mississippi river, Louisiana, in charge of Brevet Major P. G. T. Beauregard.*—The levee in front of this site has been repaired; the breast-height walls, parapets and terrepleins of the land fronts nearly completed; the passage arches into the salient place of arms faces 3-4; the one into the relieving arches of face 7; the posterior arches of face 5; the ramps of faces 2, 7, and 17; and the pavement and gutter around the magazine have been constructed.

To complete the repairs of the interior of this work, and to construct the covered way and glacis and repair the two exterior batteries, an additional appropriation will be necessary.

Balance in treasury October 1, 1857.....	\$29,369 24
Probable amount to be expended by June 30, 1858.....	29,369 24
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859 .....	10,000 00

*Fort Jackson, Mississippi river, Louisiana, in charge of Brevet Major P. G. T. Beauregard.*—This work has been in care of a fort keeper, who has been employed in looking after the materials there collected for the completion of the exterior battery, in cutting down the weeds, and mowing the grass of the parapets and terrepleins of the fort and covered way. The sum at present available will be employed in constructing the breast-height walls of the lower exterior battery, laying and setting its traverse circles and pintle blocks, constructing its magazine, and otherwise completing entirely this battery. The residue of the appropriation will be expended in such general repairs as may be needed by the main work, and in fort keeping.



*Fort Livingston, Grande Terre Island, Louisiana, in charge of Lieutenant W. H. Stevens.*—Labors here have been applied principally to works for the preservation and restoration of the site ; of these, one large breakwater has been completed, and the other is still in progress.

The appropriation asked for is designed for the continuation of these works, and the further prosecution of what yet remains to be done for the completion of the fort itself, which remains in the unfinished condition in which it has been left while awaiting the final settlement of the foundations.

Balance in treasury October 1, 1857.....	\$8,000 00
Probable amount to be expended by June 30, 1858.....	8,000 00
Estimate of amount required to be appropriated for the fiscal year ending June 30, 1859.....	50,000 00

*Fortifications for the defence of the entrance to Galveston harbor and bay, Texas.*—A special board of engineer officers have examined this locality, and the preparation of the plans for a suitable work now engages their attention, and is far advanced.

Balance in treasury October 1, 1857.....	\$80,000 00
Probable amount to be expended by June 30, 1858.....	60,000 00

*Forts on the western frontier of Texas.*—Operations are still awaiting the purchase of the requisite sites.

Balance in treasury October 1, 1857.....	\$150,000 00
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*Fortifications on Alcatraz Island, San Francisco bay, California, in charge of Lieutenant Fred. E. Prime.*—Coping of all the walls of the south battery, capponnier and adjacent three-gun battery has been laid; the masonry and earthen parapets completed ; a concrete drain formed in front of south face ; the terreplein of three-gun battery excavated to its full width ; the earth removed from front of scarp walls ; and concrete slopes formed to complete the inaccessibility in vicinity of south wing wall. In the north battery six hundred and ninety-three remaining feet of coping have been laid on its scarp and capponnier walls, terreplein excavated to full width, earth removed from front of scarp walls, and magazines finished. In the ten-gun battery the scarp and breast-height walls are built, terreplein excavated to full width, and earth in front of scarp removed. In west battery the scarp and breast-height walls are finished, magazine raised to springing line of arch, shot furnace completed, two sets of gun platforms finished and the others commenced, the parapet partly formed, and the terreplein and road leading to it in part excavated. The guard-house walls have been raised twelve and a half feet above the entrance way, the loop-holes and gateway arches turned ; the counterscarp is finished, and defensive wall leading to ten-gun battery needs only its coping for completion ; and considerable progress has been made on the wall leading to the wharf, and in the scarping of the island. A road has also been excavated to the site of the defensive barracks, and materials collected for the construction of the latter.



The funds now available will be applied to the final completion of the works at present contemplated, which may be effected, it is believed, by the end of 1858. No further appropriation is asked.

*Fortifications on Fort Point, entrance to San Francisco bay, California, in charge of Brevet Major Z. B. Tower.*—On the 30th June last the officer in charge of this work reported its condition at that date, which may be briefly stated as follows: The scarp wall on all the fronts had been carried up generally to about the sills of the embrasures of the second tier; the piers of the first tier raised to their full height; the communication arches between the casemates of this tier, and the arches supporting the floor of the second turned, and the spaces between the arches filled in with concrete; the three stair towers raised about ten feet above parade, and the steps set to that height; the excavations for the counterscarp gallery defences, and for the sea-wall at the west end of same, completed; and the excavation of the south end of the ten-gun battery exterior to the main work finished, the arch of its magazine covered with asphalt; and the slopes formed and sodded. The wharf has required some repairs, due to injuries caused by the sea worm.

The appropriation for the work not having been made in time to procure materials before the rainy season, the progress of the work has been less rapid than it would otherwise have been.

Balance in treasury October 1, 1857.....	\$424,741 05
Probable amount to be expended by June 30, 1858.....	424,741 05
Estimate of amount required to be appropriated for fiscal year ending June 30, 1859.....	150,000 00

*For purchasing a site and constructing additional defences for San Francisco, California.*—Negotiations are now in progress for the acquisition by the United States of the site upon which it is designed to commence new works for the defence of this position, the most important upon the Pacific coast.

#### CORPS OF ENGINEERS.

In relation to the necessity of an increase in the number of officers, I refer back to several previous reports, especially to that of 1855, in which was embodied a statement showing clearly the deficiency, at that time, in the number of engineer officers indispensable to the execution in a proper and economical manner of the important duties confided to the corps. This deficiency of officers becomes greater each year, and is particularly felt at this time, in view of the speedy commencement of *ten* new works of fortifications, for which grants of money were made by the last Congress.

As to the necessity for more officers there is no question; but it must be understood that while, in urging this increase of the corps of engineers, I do not desire the addition of any higher grade than now exists, I deem it absolutely necessary that the process of augmentation indicated in my report of 1855 should be strictly adhered to, to which end it should be fixed by law: that process is, "the addition, during

a term of years, of a number of second lieutenants—say three or four, on the average, per annum—with corresponding promotions within the whole corps, until the augmentation shall have reached its limit, all the additions being made at the foot of the corps by such graduates of the Military Academy, *and such only*, as shall have been recommended for appointment into the corps by the academic board."

The importance of this increase deserves the attention of Congress, and I earnestly invoke for it the support and recommendation of the War Department.

#### MILITARY ACADEMY.

Your personal inspection of the institution during the past summer will have enabled you to judge of the generally satisfactory conduct of all matters connected with its management, and have impressed you with a sense of its usefulness as a school for the education of the American officers.

The new regulations established by your predecessor for the government of the institution, which are now in course of application, have not been sufficiently tested perhaps to authorize an opinion being pronounced on the advantages or disadvantages of the changes they introduce. On this subject I may have occasion to lay before you a special report hereafter.

There are, however, several subjects intimately connected with the successful administration and efficiency of the academy which require further legislation for their establishment, and which I beg to submit for your consideration.

The first point is the establishment of local rank for the superintendent of the academy, with allowances of pay and emoluments corresponding to the responsibilities and heavy expenses unavoidably connected with the situation. It is believed that for many years no officer who has held the position has been able, with the practice of the strictest economy, to make his pay and allowances meet his expenses; whilst some are known to have drawn largely on their private resources. The military command of the post, which is vested in the superintendent, is not far different in numbers from that of a colonel of a regiment, while the importance of the position may reasonably be considered as equal, at least. I therefore propose that the local rank of colonel, and the pay and emoluments of a colonel of cavalry, be given to the officer who shall be regularly assigned as superintendent.

Another point is the importance of dividing the academic duties now under the charge of the chaplain, by providing for the greater part of them by the establishment of a new professorship, leaving such only to the chaplain as he can perform without interference with his duties as a clergyman. The creation of this professorship has been recommended by several boards of visitors, as being demanded by a proper regard to the progress of the cadets in the various branches of study embraced in the course under the supervision of the chaplain, and is the more imperatively required since these studies have been very much enlarged by the addition of another year to the academic course.

A permanent assistant professorship in the department of French, the duties of which are now performed by an officer of the army detailed for the purpose, is much needed. Whilst this will not increase the number of persons belonging to the academic staff, a great advantage may be secured in obtaining an instructor with whom the language is vernacular, and who will, therefore, be more competent to teach its pronunciation and idiom than most of our army officers. Such assistant should be put on the same footing as to pay and emoluments as the other assistant professors at the academy.

I have, also, in several of my annual reports, called attention to the importance of separating the instruction of cavalry from that of artillery, with which it is now associated by law. The effect of such a separation would be to permit the establishment of distinct departments of instruction for artillery, cavalry, and infantry, having at their head officers of the respective arms of service to which these departments pertain, who would not only be immediately responsible for the proper conduct of the duties committed to their management, but would bring to the task of instruction that zeal which can be looked for most surely in those who have the interests of their own branch of service to advance. These instructors should severally receive the same pay and emoluments as are now granted by law to the instructor of practical engineering.

I would again repeat the recommendation, often before made, that the officers serving in the department of artillery have the same pay and allowances granted to officers attached to the light batteries in service.

Another point, which received the approval of your predecessor, is, to provide for the purchase of stationery to be used by the cadets for purposes connected with their instruction. Since the course of English studies has been so much enlarged by the extension of the academic course, the expenses to the cadets for stationery used by them in this and other branches of study has become a heavy and unjust tax on their limited pay. The amount asked for, and which I suggest should be added to the estimate for the support of the academy, is only \$600, and is designed to cover the purchase of blank books, paper, drawing paper, colors, &c., &c., to be used in taking notes, writing compositions, and other exercises in the recitation rooms, and making the drawings required in the course of instruction.

The principal items of the estimate for the support of the academy for the next fiscal year are—

Current and ordinary expenses.....	\$35,610 00
Gradual increase and expense of library.....	1,000 00
Expenses of Board of Visitors.....	3,000 00
Forage for artillery and cavalry horses.....	8,640 00
Supplying horses for artillery and cavalry practice .....	1,000 00
Barracks for dragoon detachment.....	1,500 00
Barracks for artillery detachment.....	6,500 00
Purchase of bell, and mounting the same for public clock in the tower .....	450 00
Repairs to officers' quarters .....	500 00

Models for the department of cavalry, (anatomy of the horse) .....	\$250 00
Extension of water pipes and increase of reservoir.....	2,500 00
Targets and batteries for artillery exercise.....	150 00
Gas pipes and retorts, extension to cadets' mess hall, academic hall, and other public buildings.....	2,500 00
Stables for dragoon and artillery horses.....	2,468 00
<b>Total .....</b>	<b>66,068 00</b>

A communication from the superintendent, explanatory of this, is herewith; also, a statement exhibiting the condition in life of the cadets for the last sixteen years, derived from the cadets themselves; and a list of the officers of the institution on the 30th September, 1857.

The report of the Board of Visitors appointed to attend the annual examination, in June last, is also herewith.

*Statement exhibiting the condition in life of the cadets of the United States Military Academy, West Point, New York,  
for the last sixteen years, from 1842 to 1857, inclusive.*

	1842.	1843.	1844.	1845.	1846.	1847.	1848.	1849.	1850.	1851.	1852.	1853.	1854.	1855.	1856.	1857.
Parents are or were farmers or planters.	59	61	61	68	72	67	69	75	70	63	67	58	66	62	60	52
Parents are or were mechanics....	14	12	15	22	22	25	22	21	16	14	14	13	12	17	26	22
Fathers are or were judges or lawyers.	27	25	30	35	33	30	29	23	34	33	34	35	36	36	25	29
Fathers are or were merchants....	18	15	28	37	29	29	31	38	36	38	35	35	39	40	30	26
Fathers are or were boarding house or hotel keepers.	5	2	4	3	7	6	4	2	2	2	3		5	2	2	1
Fathers are or were physicians...	12	15	15	13	21	19	21	21	18	14	14	13	9	8	9	17
Fathers are or were in the army, navy, or marine corps.	14	16	16	13	11	13	17	17	18	22	24	27	28	22	20	20
Fathers are or were clergymen...	4	6	6	6	5	3	3	4	4	4	3	5	4	6	5	4
Fathers are or were in the civil employment of the general or State government.	5	15	16	9	5	2	3	7	7	8	10	11	14	13	18	17
Miscellaneous, as bank officers, editors, professors, engineers, masters of vessels.	15	11	15	23	35	36	41	24	32	30	30	26	14	25	13	13
Occupation not stated, or no occupation.	48	34	23	17	1	2	2	8	7	11	13	7	10	19	15	20
Total.....	221	212	224	236	241	232	243	240	244	233	247	232	237	239	223	221
Of these numbers, there were without fathers living.	26	57	44	48	42	41	54	48	40	45	36	35	29	33	33	34
Without father or mother living..	22	16	18	15	21	20	18	16	26	17	19	17	15	9	6	7
Total orphans.....	48	73	62	63	63	61	72	64	66	62	55	52	44	42	39	41

## STATEMENT—Continued.

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	1842.	1843.	1844.	1845.	1846.	1847.	1848.	1849.	1850.	1851.	1852.	1853.	1854.	1855.	1856.	1857.
Of this number, the parents are stated to be in moderate circumstances.	-----	156	150	164	192	182	193	203	215	207	218	206	206	215	196	195
Of this number, the parents are stated to be in reduced circumstances.	182	26	26	36	35	38	40	29	25	16		8	8		8	
Of this number, the parents are stated to be in indigent circumstances.	-----	6	8	8	8	8	4	4	2		-----	-----	1	1	1	1
Of this number, the parents are stated to be in independent circumstances.	-----	6	10	12	6	4	5	4	2	14	20	19	22	16	18	17
Of these numbers, the parents are stated to be in unknown circumstances.	39	18	19	16	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Total.....	221	212	224	236	241	232	242	240	244	233	247	232	237	239	223	221

REPORT OF THE

*List of officers and professors of the United States Military Academy, September 30, 1857, showing the name, rank, where born, and State or country from where appointed.*

ACADEMIC STAFF.

Names.	Rank.	Corps or regiment.	Where born.	Appointed from.	Department.
Richard Delafield.....	Major.....	Engineers.....	New York.....	Mil'y Academy.....	Superintendent and commandant.
Dennis H. Mahon, LLD.....	Professor.....	.....do.....	.....do.....	Engineer corps.....	Professor of civil and military engineering.
Thomas L. Casey.....	1st lieutenant.....	Engineers.....	.....do.....	Mil'y Academy.....	Assistant professor of engineering.
Newton F. Alexander.....	2d lieutenant.....	.....do.....	Tennessee.....	.....do.....	Acting assistant professor of engineering.
Andrew J. Donelson.....	1st lieutenant.....	.....do.....	.....do.....	.....do.....	Instructor of practical engineering.
W. H. C. Bartlett, LLD.....	Professor.....	.....do.....	New York.....	Engineer corps.....	Prof. of natural and experimental philosophy.
John M. Schofield.....	1st lieutenant.....	1st artillery.....	.....do.....	Mil'y Academy.....	Assistant professor of philosophy.
Albert E. Church, LLD.....	Professor.....	.....do.....	Connecticut.....	3d artillery.....	Professor of mathematics.
Absolom Baird, AM.....	1st lieutenant.....	1st artillery.....	Pennsylvania.....	Mil'y Academy.....	Assistant professor of mathematics.
Adam J. Slemmer.....	.....do.....	.....do.....	.....do.....	.....do.....	Acting assistant professor of mathematics.
James Thompson.....	.....do.....	2d artillery.....	New York.....	.....do.....	Do. do. do.
Matthew M. Blunt, AM.....	.....do.....	.....do.....	.....do.....	.....do.....	Do. do. do.
Oliver H. Howard.....	.....do.....	Ordnance.....	Maine.....	.....do.....	Do. do. do.
Henry L. Kendrick.....	Professor.....	.....do.....	New Hampshire.....	.....do.....	Prof. of chemistry, mineralogy, and geology.
Caleb Huse.....	1st lieutenant.....	1st artillery.....	Massachusetts.....	.....do.....	Assistant professor of ditto.
James G. Benton.....	Captain.....	Ordnance.....	New Hampshire.....	.....do.....	Instructor of ordnance and science of gunnery.
Wm. J. Hardee.....	Major & bvt. lt. col.	2d cavalry.....	Georgia.....	.....do.....	Commandant of cadets, instructor of artillery, cavalry, and infantry tactics.
Charles W. Field.....	1st lieutenant.....	.....do.....	Kentucky.....	.....do.....	Acting assistant instructor of tactics.
George L. Hartsuff.....	.....do.....	2d artillery.....	New York.....	.....do.....	Do. do. do.
John C. Kelton.....	.....do.....	6th infantry.....	Pennsylvania.....	.....do.....	Do. do. do.
Rev. John W. French, AM.....	Professor.....	.....do.....	Connecticut.....	Dis. of Columbia.....	Chaplain and professor of ethics.
William Silvey.....	1st lieutenant.....	1st artillery.....	Ohio.....	Mil'y Academy.....	Assistant professor of ethics.
Henry C. Symonds.....	.....do.....	2d artillery.....	Massachusetts.....	.....do.....	Do. do. do.
John T. Greble, AM.....	.....do.....	.....do.....	Pennsylvania.....	.....do.....	Do. do. do.
Frederick L. Childs.....	2d lieutenant.....	1st artillery.....	Maine.....	.....do.....	Do. do. do.
Robert W. Wier, N. A.....	Professor.....	.....do.....	New York.....	New York.....	Professor of drawing.
Alexander J. Perry.....	1st lieutenant.....	2d artillery.....	Connecticut.....	Mil'y Academy.....	Assistant professor of drawing.



# LIST—Continued.

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Names.	Rank.	Corps or Regiment.	Where born.	Appointed from.	Department.
Hyacinth R. Agnel.....	Professor .....	.....	New York.....	New York.....	Professor of French.
Samuel F. Chalfin.....	1st Lieutenant.....	1st artillery .....	Illinois .....	Mil'y Academy..	Assistant professor of French.
Edward R. Platt.....	do.....	2d artillery.....	Vermont.....	do.....	Acting assistant professor of French.
Patrice D. Janon.....	Professor.....	.....	Carthage.....	New York.....	Professor of Spanish.
Robert H. Anderson.....	Brevet 2d lieut.....	7th infantry .....	Georgia .....	.....	On temporary duty with dragoon detachment.

## MILITARY STAFF.

James B. Fry.....	1st Lieutenant.....	1st artillery .....	Illinois.....	Mil'y Academy..	Adjutant.
John Gibbon.....	do.....	4th artillery .....	North Carolina..	do.....	Quartermaster.
Samuel P. Moore, M. D.....	Surgeon.....	.....	South Carolina..	South Carolina..	
John Campbell, M. D.....	Assistant surgeon..	.....	New York.....	New York.....	

REPORT OF THE

UNITED STATES MILITARY ACADEMY,  
West Point, September 25, 1857.

SIR: The appropriation for the current year amounts to \$67,165, and the sums now estimated is \$66,068—being a reduction in the annual estimate of \$1,097.

During the past session of Congress the pay of the cadets was raised from \$24 to \$30 per month, the result of which has been to reduce the indebtedness of the corps of cadets to the sum of \$2,629 64 on the 31st of August, and less than at any corresponding period since the year 1849, when it was \$2,471 99.

The indebtedness of the corps of cadets on the 31st of August, 1846, was \$7,627 88; 1847, was \$5,097; 1848, was \$4,131 72; 1849, was \$2,471 99; 1850, was \$3,886 75; 1851, was \$3,365 08; 1852, was \$3,404 17; 1853, was \$4,880 94; 1854, was \$6,248 06; 1855, was \$5,686 98; 1856, was \$4,279 99; 1857, was \$2,629 64.

With the increased pay now authorized by law, and strict attention given to economize their expenses, it is hoped and believed that by this time next year very few of them will be in debt. At present 132 of them are in debt, and 109 have small sums to their credit in account with the treasurer.

It must be understood that from the pay allowed a cadet he is provided with his food, clothing, books, stationery, mathematical instruments, bedding, room furniture, lights, and military equipments, excepting arms, which has kept the corps in debt, as above stated.

During the five years preceding 1846, when the pay of a cadet was \$28 per month, the average indebtedness at the corresponding period of the year was \$3,133 19.

The first five items of the preceding estimate remains as for many years past.

No. 6. For dragoon barracks \$5,000 was appropriated last year. It has been, and is being, applied to erecting a two story brick building on the foundation of the former decayed wooden structure. To do this, the dragoons were encamped, and so remain.

The brick work of the new structure is now finished, and by the 1st of November it will be habitable, though not finished, when the troops must be moved from the camp into winter quarters. The rooms will be floored, but the ceilings, kitchen, and basement, cannot be finished until additional funds are made available, and for this purpose the sum of \$1,500 is now introduced in this estimate.

No. 7. The artillery detachment is quartered in a decayed and wooden building—part of an old laboratory and artillery shed that were removed from the site of the library in 1840 (about.) It, like the one lately occupied by the dragoons, is unsuited for the accommodation of these men, and not such as our enlisted soldiers have a right to expect, or the government should provide for the privates of the army. On the stone foundation of the present structure it is proposed to construct a two story brick building, during the next season, putting the men into camp for the time, and for which \$6,500 will suffice.

No. 8 is called for to purchase a bell for the clock and tower, for which an appropriation of \$700 was made in 1856, and \$800 in 1857.

The clock and tower are advancing towards completion, and will be finished this fall. The means of purchasing a suitable bell, and adding a dial on the east face, is now asked for. No more of this structure has been undertaken than the available funds would perfect.

Nos. 9, 10, and 11, are for the same purposes as previous years, with a diminution in No. 10 of \$750, and an increase of \$500 for the reservoir. An appropriation of \$2,000 was made last year for this purpose, but little work on which has been done in consequence of the unprecedented wet season, and the conveniences of the post not permitting more work to be undertaken than the dragoon barrack, clock tower, and gas works. The sum now asked for is to be applied to the dam forming the reservoir, and pipes to distribute the water to public buildings, where, at times, it has to be hauled by teams, though this season has been altogether exempt from such evil; a like sum the succeeding year should suffice to do all that is necessary, but not desired sooner, as the work should progress slowly, to suit the convenience and labor of the locality.

No. 13 is to extend gas light to the public buildings. These works are now in such a state of forwardness as to be in operation this fall. All the pipes in the cadets' barracks—the main thereto is being laid—the gas house, retorts, gas holders, and cistern, of 35' diameter, with furnace, and all other more minute parts, are nearly completed. The appropriation of last year of \$7,500 has been exclusively applied to constructing the works, and extending the use of the gas to the cadets' barracks. To introduce it into the cadets' mess hall, and other public buildings, (requiring only house pipes and prolongation of the street main,) the sum of \$2,500 is now asked; the capacity of the works suffice for all the buildings by extending the pipes. These works, suitable for one thousand burners, will be completed for the sum appropriated; but it must not be understood that the like can be built elsewhere for that sum. An old vacated stone building (stable) has been appropriated to this purpose, whereby much expense is saved. A like sum of \$2,500 another year may become necessary to extend the advantages of gas to all the public buildings, beyond which no additional outlay can be foreseen or believed to be necessary, and which cannot advantageously be used the next year—the sum at present called for being sufficient to absorb all the conveniences of application at command.

No. 14. This item is to finish one-half of the stables, for which appropriations were made in 1855. During the present season the north half has been paved with granite blocks through the centre, and with brick on edge in all the stables, with a stone gutter behind each line of stalls to drain them. The other half had been used in part, is still in use. It was paved throughout with round cobble stones, (that prove injurious to the horses feet,) often requiring renewal, and not to be kept clean. It is proposed the next year to pave this, and finish it as the northern half.

RICHARD DELAFIELD,

*Major Engineers, Superintendent Military Academy.*

GENERAL JOSEPH G. TOTTEN,

*Chief Engineer.*

## UNITED STATES MILITARY ACADEMY.

*Report of the Board of Visitors to the United States Military Academy at West Point.*UNITED STATES MILITARY ACADEMY,  
West Point, N. Y., June 16, 1857.

SIR: The Board of Visitors, invited in accordance with law by the Secretary of War to attend the annual examination of the military academy at West Point, have the honor to submit the following report:

The undersigned members of the Board assembled at this place on the 1st of June, 1857, and organized for the transaction of business on the day following. Special committees were appointed by the president upon the several subjects indicated in our letters of invitation, and which it is made the duty of the Board to investigate.

Every facility was afforded these several committees by the superintendent and the officers of the academy to enable them, as well as the entire Board, to make as full and satisfactory an examination of the subjects referred to, and of the general concerns of the institution, as the time allotted to ourselves would allow.

The examination of the graduating class of cadets was conducted during six days—from 9 o'clock a. m. until 3 o'clock p. m. of each day—in the presence of our own and the academic board. They were examined in engineering, ethics, mineralogy, and geology, artillery, infantry, and cavalry tactics. Besides attendance upon these examinations, the proficiency of the class in artillery, cavalry, and infantry drill, and in the application of various branches of knowledge connected with the profession of arms, was displayed by daily exercises after 5 o'clock p. m., under the order of the superintendent, in the presence of the Board.

After the first six days the examination of the second, third, fourth, and fifth classes proceeded in the different rooms of the academic buildings, in mathematics, philosophy, English studies, chemistry, Spanish and French languages. The members of our Board were also invited by the superintendent to be present at these examinations, but owing to the pressure of other duties were obliged to forego as full and constant attendance upon them as it would otherwise have been our pleasure to bestow. Sufficient attention, however, was given to enable us to form a favorable opinion of their thorough and impartial character.

We also examined with great pleasure the gallery of drawings of the cadets.

All these various examinations and exercises, and the results exhibited for our inspection, whilst they were interesting and entertaining to us, spoke in the highest terms of commendation of the diligence and talent of the pupils, and of the abilities of their instructors.

Our sessions were frequent and characterized by the utmost harmony of feeling, the freest interchange of sentiments, and a remarkable unanimity of opinion.

We availed ourselves of every source of information within our reach—conference with the superintendent, conversation with the various members of the academic staff, as well as with members of the graduating class, who, in compliance with our invitation, were present at two of our sessions.

Each select committee attended to the duty assigned it, and reported in writing the results of its investigation to the board. The facts reported by them and the views expressed were fully discussed in committee of the whole; and, instead of transmitting those several reports to the department, it has been deemed by us more proper to embrace in this general report the results of the examinations of our several committees and the recommendations which we have considered it our duty to make.

To the general plan, purpose and propriety of the institution of the military academy, we render our entire and unanimous approbation. The necessity of an army for the public defence implies the necessity of a government school for the education and preparation of its officers. It is believed by the board that this academy, by reason of circumstances and causes which it is unnecessary now to recapitulate, has the respect and confidence of the whole country, and that an enlightened public sentiment will not only justify, but require the adoption of all measures necessary to increase its efficiency and usefulness.

Perfection can be claimed for no human institution; indeed, progressive change and development seems to be the universal law of all healthy life, and of the first necessity in all subordinate organizations especially, which are designed to keep pace with or promote the general progress of mind. And whilst we desire to present with proper deference the conclusions to which we have arrived, and the considerations in brief which have led to them, we derive confidence in their correctness from the fact that they are the unanimous judgment of twelve minds, assembled here without previous conference or acquaintance, from as many different States of the Union, with no possible purpose to subserve but to advance the usefulness of this institution, and to promote the efficiency of the public service.

### *The Course and System of Instruction, &c.*

First, then, in reference to the subject of instruction. It is scarcely necessary to premise that, in view of the limited time allowed to an investigation, we approached this important subject with extreme caution.

We have been impelled, however, to the conclusion that the amount of study required to compass the course laid down is excessive in quantity, and that the character of the knowledge acquired is not in all cases adapted to the ends to be attained. The most unremitting intellectual effort seems to be required during the entire term of the cadet at the academy. No mental relaxation comparatively is allowed—not even occasional change in the system or method of instruction, much less the relief that would be afforded by historical or other reading, kindred to the subjects of study. Whilst the proficiency displayed by the cadets under examination is alike creditable to their

own apt industry and to the zeal and capacity of their teachers, we are not satisfied that this proficiency is a healthy development of all the intellectual faculties required to be trained. One of the first results which attracted the general attention of the board was the small number of graduates in comparison with the number of cadets annually admitted into the academy. This disparity, perhaps more powerful than any other single cause, operated to give the investigation of our body the radical character indicated by the conclusions to which we have arrived. The class graduating thirty-eight members this year entered the academy four years ago numbering ninety-six.

It would be a violent supposition to assume that the fifty-eight members who entered with those now graduating were all wanting in mental capacity to become efficient and educated officers. This great disparity occurs in almost every graduating class, and as the staff of instruction is sufficiently large to conduct through the entire course a much greater number of cadets than those who graduate, it becomes important, as it is manifestly proper, to inquire whether the system of instruction and mental discipline might not be so changed, without impairing its efficiency, as to relax the strain upon the youthful mind, and by leading it into a more gradual and normal and less imperative development, save to the institution and the service some intellect and spirit which might eventually confer honor on both. Might not the system be modified without injury by teaching, in the form of well-digested lectures, to be prepared by the instructors, those branches which may not require the accuracy of study demanded by the exact sciences? This subject of the excessive course of study has not now for the first time been brought to the notice of the proper authorities.

It was to meet the requirements of reason upon this point that the term of the cadet at the academy has been increased from four years to five; but such has been the character of the changes and transpositions and additions of studies, that no relief is experienced, but rather a complication of difficulties has resulted. For example, let the present condition of the department of ethics be taken. Originally it was designed, in connexion with the chaplaincy, to afford that moral and religious culture necessary and proper to be imparted to young men. The various modifications of the course of study, made from time to time, have imposed upon this department English grammar, geography, history, rhetoric, elocution, international and constitutional law, the Constitution of the United States, and logic. The Board is fully persuaded that the great evil to be remedied cannot be reached by mere amendments, but that a revision and reorganization of the whole course and system of instruction is necessary, in accordance with one enlightened and comprehensive idea.

With regard to the kind of knowledge imparted, and its adaptation to the ends to be attained, the Board have conferred freely together, and in forming our opinions have of course availed ourselves of such previous reflection as various circumstances have enabled us to bestow upon some of the branches of study embraced in the course.

Without entering here upon a critical or detailed discussion of the merits of many of the text-books now used at the academy, the Board are constrained to say that those used upon the subjects of chemistry,



geology, logic, moral science, history and constitutional law are not, in our judgment, adapted in arrangement and character to the course and method proper to be pursued at this institution.

In reference to the changes which the advanced condition of military science and the various circumstances peculiar to our country required in the system of engineering now taught at the academy, the Board beg leave to recommend, with entire approval, the paper prepared and submitted to our body by First Lieutenant James St. C. Morton, of the engineer corps, who is acting assistant professor of military and civil engineering at the academy, and we respectfully request that it may be published with, and appended to, this report. Its excellent common sense views commended it at once to the approval of the Board, whilst by one member of our body, at least, it was received and recognized as the able exposition of an idea by them long entertained, and often a subject of discussion in the engineering branch of the service.

We are fully persuaded that the best interests of this institution and of the army at large requires a careful and liberal consideration of the subject-matter of the paper referred to, and that the spirit of reform which it exhibits cannot fail, in its general application, to produce the most beneficial results to the public service.

Before indicating the measures which the Board will recommend to carry out the reforms hereinbefore suggested, and a military organization for the academy which we propose, it may be proper to report upon other matters of comparatively less importance connected with the institution.

#### *The demerit system.*

This is another subject which has received the careful consideration of the board, and we respectfully recommend that it shall be modified in accordance with the plan submitted by Major Delafield to the Adjutant General on January 9, 1857, with an additional feature, requiring a record to be kept and published under distinct heads, so that conduct and intellectual standing may appear according to separate footings. If, however, the recommendation which we hereafter make in reference to a general revising board be responded to, the amendment of the demerit system would properly come within scope of their duties.

#### *Appointments.*

It is our opinion that the number of appointments should be increased, by conceding to each Senator in Congress the privilege of a nomination. The very considerable loss suffered, under any circumstances by every entering class, would thus be compensated for. By this means the number of cadets constantly under instruction would approach more nearly that which the law establishes in theory, and the whole power of the academic board be brought into requisition. We recommend also, that a certificate of good physical condition shall be required from the nearest army or navy surgeon, before the appli-



cant shall be permitted to present himself at the academy for admission as a cadet.

*Health, police, &c.*

The board are satisfied, from the report of the special committee upon this subject, that no essential changes are necessary in the present arrangements in this department; and that efficient, skillful, and proper attention is bestowed by those in authority. Improvements in the bathing arrangements of the cadets' hospital are very necessary, and ought to be made without delay.

*The library.*

The library of the academy is remarkably complete in the collection of works in the exact sciences and the military art, but is deficient in English classical literature, ethical philosophy, &c.

*Privileges of cadets.*

Without entering upon this subject generally in this place, in the expectation that it will receive the attention to which it may be entitled hereafter, we cannot refrain from recommending that cadets shall be allowed the privilege of visiting their own immediate families in case of death or dangerous sickness, upon evidence of the fact satisfactory to the superintendent. We find, too, that the library privileges of the cadets are very limited. They are only allowed to draw books from it on Saturday afternoon, to be returned on Monday morning. This restricted use of the library is perhaps in some degree necessary, in view of the amount of time required of the cadet to attend to his studies and exercises. We do not hesitate to disprove it, but at the same time regard it as an evil in some sort incident to the present system of instruction and discipline.

*Fiscal affairs.*

In reference to this subject, the board are satisfied with the system upon which the finances of the academy are administered, the accounts of cadets kept, &c.; all the requisite information upon this head is already in possession of the department, and we have not considered it necessary, therefore, to append it to this report.

With regard to the insufficiency of the cadets' commons the board have ordered a note to be addressed to the superintendent, and it is therefore unnecessary to allude to it further in this place.

*General administration.*

The board deem it their duty to suggest a change in the military organization of the academy in accordance with the following plan:

1. A superintendent appointed as at present, from the engineer corps, with the local rank of colonel, and such annual salary as the exigencies of his position require. This officer to have immediate

military and civil government of the institution, and to be responsible for its correct management.

2. A commander of the garrison to be appointed from the army, with the local rank of lieutenant colonel. This officer to command the whole military force of the post, including the corps of cadets, and to be subject to the order of the superintendent. He shall not be entitled to a seat in the Academic Board except in case of the death, disability or absence of the superintendent.

3. A commander of the corps of cadets to be appointed from the infantry, with the pay of major. This officer also to be instructor of infantry tactics.

4. A commander of the company of engineers, to be appointed from the corps of engineers, with the pay of captain. This officer to be also instructor of practical military and civil engineering.

5. A commander of cavalry to be taken from the cavalry or dragoons, with the pay of captain. This officer to be also instructor of cavalry tactics.

6. A commander of artillery to be appointed from the artillery, with the pay of captain of engineers. To be instructor also of the theory and practice of artillery in all of its branches.

7. An adjutant to the superintendent.

8. An adjutant to the commandant of the garrison.

9. A surgeon.

10. An assistant surgeon.

11. A quartermaster.

12. A treasurer.

Of these officers the superintendent, the commandant of the cadets, of engineers, of cavalry, and of the artillery, to be members of the Academic Board.

The effect of this organization would be to establish the proper subordinate relations at the academy and post, and to give the artillery and infantry that representation at the Academic Board which is now denied them, but to which they are justly entitled, and which the public interests demand.

The aggregate of the academy and military forces of all arms at West Point is numerically equal to a regiment of the line. An organization assimilating to that of a regiment is therefore proposed, giving to the superintendent the local rank of colonel. By this arrangement, whilst efficiency of command will be secured, the field for the selection of the superintendent will be greatly enlarged.

In designating the salary of the superintendent, an ample allowance, to enable that functionary to meet the requirements due to reception and hospitality, should be made. The present superintendent and preceeding ones have been obliged to expend more than their salaries whilst in office. This should not be. Simple justice, as well as a decent respect for the proprieties properly incident to an important official position, require judicious liberality in regard to this matter.

Convinced as we are that very important and radical changes are necessary to secure all the beneficial results which the country has a right to expect from the Military Academy, and to the end that the suggestions and recommendations of this report may receive due con-

sideration, we beg leave respectfully to recommend that the whole matter of instruction, discipline, text books, military organization, &c., be referred to a select board, with power to sit at the post and to call for information from all sources whence it can be derived.

In this cautious and deliberate way we are persuaded a more judicious and efficient system might be elaborated from that now in operation. To insure wisdom, experience, impartiality, and confidence in the action of such a board, we suggest that it should be composed of the Academic Board of this institution, together with two officers of engineers, two from the artillery, infantry, or cavalry, and four civilians, eminent in literature and science; and that the superintendent of the academy should be its presiding officer. One word in regard to the general effect of strict military discipline and training, and an evil to be guarded against, and we have done: Whilst a proper *esprit du corps* should always, and under all circumstances, characterize the American officer, it should be a leading idea inculcated during the term of his education at this institution, that the real force of his country lies in its citizen soldiery; that he is educated under a system of national military organization, which is an anomaly in the history of the world and which is adapted to the peculiar political system of the American republic. That while the educated officer is necessary to promote the high efficiency of active forces in the field, the spirit and patriotism of free citizens is the soul and the substance of that force. When, therefore, in the exigencies of the public service he may be brought into contact with, or assigned to command forces of this description, he must remember that they are the free citizens of the republic, and not mercenary soldiers like those which chiefly compose the other armies of the world; and while they are intelligent enough to know the necessity of, and to yield obedience to, wholesome military discipline, the very spirit which impels them to the field revolts at what they may conceive to be a harsh or domineering exercise of authority.

All of which is respectfully submitted.

WH. H. CHASE, of *Florida*,  
*President of the Board.*  
 GEO. W. HOUCK, of *Ohio*, *Sec'y.*  
 NOBLE S. ELDERKIN, of *New York.*  
 B. F. BUTLER, of *Massachusetts.*  
 SAMUEL H. BLAKE, of *Maine.*  
 CAMPBELL MORFIT, of *Maryland.*  
 R. B. LINDSAY, of *Alabama.*  
 HENRY C. DEMING, of *Connecticut.*  
 E. H. BRYAN, of *Mississippi.*  
 PAUL J. SEMMES, of *Georgia.*  
 JOSHUA PHELPS, of *Iowa.*  
 DANIEL READ, of *Wisconsin.*

Hon. JOHN B. FLOYD,  
*Secretary of War.*

*Paper submitted to the Board of Visitors by Lieut. James St. C. Morton.*

Are civil and military engineering taught at the West Point Military Academy in a manner which demands no changes in the text books or in the method followed?

If not, is this an opportune moment to suggest changes, and will there be found sufficient space to admit of their incorporation into the present course?

Whatever may be the answer which those two questions receive, it should not be given hastily; the most impartial consideration, and a judgment wholly unbiassed by the prestige of the existing system of instruction, are required in order to insure a just conclusion.

I think it can be shown that the academy will profit directly by a judicious remodelling of the department in question, and also indirectly from the impulse which such an example would give to certain other departments now equally in need of improvement.\*

To begin with the 2d question, I will state that the change from the four years term to the five years was commenced with the lowest class, which was halved for the purpose; and that in this and the succeeding classes the time devoted to the several studies has been successively increased. The first and second classes will be reached in the present year and the next, and they will afterwards devote more time than heretofore to the studies in question. The second class will study civil, and the first military engineering.

In September, 1857, the second class will commence civil engineering, and will recite on this subject every other day for nine months, or for four and a half months. At present they devote four months to this course, so that there will be a gain of two weeks at least, and I will indicate a way to obtain six more, so that the course may be increased one half.

In September, 1858, the same class—then become the first—will enter upon a nine months' course of military engineering, while at present only half of that time is available; so that there will be an opportunity of doubling the course; besides, a term of six weeks, now devoted to drawing, (as explained further on,) may be better used in developing the subject in other ways.

It appears, therefore, that ample time is disposable for innovations, and even that enlargement is necessary to employ the increased space to be allowed to engineering; and since the plan to be adopted in arranging the new and enlarged courses must be decided upon within a year, the present is a highly suitable opportunity to advance opinions, which, if well founded, will tend to effect considerable changes in any plan which is based on the present one.

In considering the first question, I shall be as concise as possible, only going sufficiently into detail to show that the ideas here advanced are not vague in themselves nor impracticable in execution.

I must also ask space enough to explain that my suggestions are called for by actual deficiencies and defects in the existing system of instruction. This part of my task must necessarily impart to the whole a tone of criticism which I regret; but without proving that

\* This remark cannot and does not apply to the philosophical department.

there is reason and room for changes, my remarks might be judged superfluous and uncalled for.

In the discussion, to avoid confusion, and for facility of reference, I shall separate the subject into distinct heads, commencing with the least important in a military school.

#### CIVIL ENGINEERING.

It will be remarked that the present text book on this subject at the academy is compiled in a great measure from English, French, and German sources, especially from the former.

But since there is a wide difference between the engineering necessities of these countries and our own, and because of the still greater variation from foreign types that may be noticed in the style of construction of our civil works, I consider that a decidedly *American* text book is required.

I have not space for an elaborate comparison of the English and American schools; this is, in fact, unnecessary, as it must be granted that there is a great variation in their practice.

The expansion which this country has experienced within the present century—an expansion unprecedented for extent and rapidity—has necessitated, and gone hand in hand with, an immense development of civil works of all kinds. The incessant call thus kept up for the first talent of the country has produced a body of experienced and practical engineers who are in advance of the profession in Europe in at least one branch of their art, and that the most important, viz: railroading.

Now if American engineering, thus developed by experience and necessity, has assumed a style of practice peculiarly its own, it is fair to assume that this is the one best suited to the country, and the proper one to inculcate at the Military Academy.

For example, our railroads and canals are often laid out through unsettled districts; the capital of the projectors is limited; labor is often scarce, especially at the outset; and despatch is as important an element as cost. These controlling influences must cause a variation from the European practice, and those due to the grander natural features of the country are also of weight.

The length of the lines, the mountain ranges to wind over or penetrate, and the wide rivers to cross, combine with the first mentioned causes to impart a magnitude as well as a peculiarity to our enterprises, which renders the substantial and splendid but costly style of English works out of place, and unsuited for imitation.

An American text book should regard railroads as a highly important branch of engineering, especially as they comprise within themselves nearly all the constructions which belong to the art; and the method of their construction and the principles of laying them out should be thoroughly taught. Now in the same manner that a good engineer must be formed by experience, practice, and observation, so a student will learn more by noting the experience of others than by studying, however carefully, a collection of rules. These are, no doubt, derived from experience; but the student does not appreciate

this, and fails to fix them in his mind as so many facts, because he has not been able to accept them as such.

The railroad experience of the country may be exhibited in various ways; but the best one is to describe thoroughly a few of the most important lines, giving a correct idea of them by topographical maps, profiles, and detailed drawings. The method of laying out on the ground of the curves, gradients, levels, profiles, &c., may be taught practically with the instruments.

Next to the propriety of using a peculiarly American text book I would recommend that of making it as useful and practical as possible.

To this end it should pay attention to the cost of all constructions, and to some other points, which will be noticed in succession.

1. The cost in the United States of materials, workmanship, and labor, of ordinary descriptions, should be laid down in all enumerations of materials, and in descriptions of military and civil constructions; and the student should learn some little about drawing up specifications and making estimates; these latter are part of the duties of a chief engineer, and with the necessary elements and data ought to form part of a course, which, like the one in use, is more devoted to the higher branches of the profession than to the practical duties of the rodman, surveyor, or assistant.

It is true that prices and wages vary in different sections of the country, and also from time to time; but this only shows that tables of prices should be made out, and be kept constantly correct, instead of being a reason for omitting all notice of this important element in engineering problems. Now at present the words "dollars and cents" do not occur in the text books, nor is there any information on actual cost in the course.

A student ought to have some idea of the prices of cast and wrought-iron, of lime, cement, building stones, brick, timber, machines, steam engines, &c. Also, in order to make an estimate, there should be laid down, approximately, the wages of mechanics and laborers, and such items as the cost of earth work and masonry, of running steam engines, &c.

Such information would be neither difficult to obtain nor hard to learn. It is to be found in American "books of the trades," and periodicals, and a good deal may be got from the papers of the United States engineer corps. As, however, the rapid changes in engineering very soon leave behind and render useless for reference all publications of this kind, as far as cost is concerned, I mention them more as examples than to recommend compilation from them.

2. Tables of experiments on strength of materials should be from American sources, and relate to the materials in use in America, and to those only.

Take, for example, timber: In the Military Academy text books on civil engineering, we find two tables showing the tensile and crushing strength of about thirty kinds of timber, such as are used by builders in England.

On the subjects of lime and stone: There are four tables, with about forty-five figures, on the strength of English building stones,



none of which are used in this country, and there are none for any kind of American stone; there are, also, tables of the strength of foreign limes and mortars, and accounts of the modes of manufacturing them. Now, our hydraulic mortars are essentially different from the foreign ones, and we have long ceased to import Roman cement for building purposes. The cheapness of our hydraulic cement renders unprofitable the processes resorted to abroad for manufacturing an article which is inferior in quality.

Now, as all foreign information on the above subjects is of no practical use here, and causes superfluous study, and as, on the other hand, with the same pains bestowed on similar data for American materials, the student would acquire knowledge immediately useful to him, I submit that the course would gain by the change recommended above.

There are ample sources of information in this head; and in the absence of such, for any special point, direct experiment may be resorted to by means, for example, of the machine used at some foundries for testing samples of iron.

3. The department of engineering ought to possess collections of all the varieties of timber, cast and wrought-iron, building stones and limestones, and other materials referred to in the course.

A pupil cannot properly be expected to give an intelligent account of the natures and appearances of different qualities, for example, of iron, when all his knowledge of them is derived from a book, since the mass of youths who enter the academy either have not taken the pains, or never had an opportunity, to learn anything on such a subject by personal observation. A student cannot possibly describe the trees of America with respect to their leaf or bark, the hardness, durability, and strength of its timber, and the uses for which its qualities fit it, when probably he is unable to recognize more than a few of them in the woods, and not many by the appearance of the grain.

To exact recitations on this subject without having resort to the aids I propose, is to oblige the cadet to memorize his lessons for the purpose of getting a good mark on it; thus causing (as in many other instances throughout the academy) a waste of labor, and a wear and tear of the intellect, without a sufficient return.

I am strengthened in the opinion that the careful observation of fine collections will be of great service, by the fact that I have exhibited a private one to my class at West Point, and observed that the cadets displayed a real interest in the subject when thus illustrated and explained. There is no doubt but that both instructor and pupil will gain by the change; the former, because of the greater zeal and success of the latter.

For a collection of timber, I would recommend a slice of each species of tree, cut across the grain, showing the texture of the heart and sap, and the appearance of the bark; to be planed, and, when the wood is susceptible of it, polished. An herbarium should accompany this collection, showing the leaf and the fruit or seed of each variety.

There should be a collection of irons, both cast and wrought, exhibiting a fracture, so as to show the grain, color, lustre, &c., of each variety. Such a collection of samples would be rather troublesome.



to keep in order, but the trouble of replacing the rusty pieces by new ones would be repaid by the resulting benefits.

A collection of building stones should comprise cubes of three inches, smooth or polished on one face.

There should also be samples of brick, lime, stones, and other materials not as important as to need enumeration.

Such a museum as above recommended would be of service to naturalists generally for reference, and would be an ornament to the academy, as well as directly useful for the purposes of instruction.

4. With regard to the course on machines, which is studied at present only by the highest section of the class, on account of the theory of the subject being developed by a calculus too hard for the rest to comprehend, I should recommend that it may be made more practical. The theory ought to be by this time understood by the cadets who reach this class, since they are all well grounded in it in the course of mechanics studied the previous year. It follows that there may be time saved in the engineering course by avoiding this repetition, and in place of it there might be taught a practical course, such as a mechanic would understand and be able to explain.

Such a course should explain the various applications of power—whether steam, water, or animal—to the ordinary purposes of the engineer. For example, there should be taught (orally and by models) the best kinds of steam machines for dredging, pumping, and pile driving; mill machinery, steam and horse power, cranes and derricks, both stationary and travelling; all these, at least in addition to the locomotive, stationary and steamboat engines, now explained to the highest section. Some practical rules should also be added to that given in the course for measuring the horse power of engines.

5. On the subject of foundations of edifices, there should be added the most recent methods for building on shoals and under water, &c. The pneumatic pile and screw pile should be described; and for this purpose models of some of our light-houses will be excellent illustrations. Our seacoast forts also furnish some interesting examples of good foundations being secured under great disadvantages.

6. The use of cast and wrought-iron, and of corrugated iron, as building materials, especially in the construction of fire-proof buildings, should be noticed; examples may be obtained from our custom-houses and military buildings.

7. On the subject of river and seacoast improvements, I recommend an alteration in the matter and manner of treatment similar to that above proposed for railroads.

This branch of engineering has been illustrated on our rivers, lakes, and the sea-coast by works of the engineer and topographical engineer corps, which will compare favorably with any foreign ones for economy, success, and exhibition of perfect knowledge of the subject. Only one of these is alluded to in the present course, and of that no more than a passing remark is made; whereas, by explaining the subject of plans and drawings of the most important and successful American works, the student will gain practical and enlarged ideas, while, in addition, there will be offered to the engineering profession

of the country a fund of information which, although very valuable, is now lying hid in drawers and pigeon holes in the offices at Washington out of reach of the mass of the profession.

8. Architecture should be taught in a rather more practical manner. A description of the orders and a few pages of rules, general enough to apply to all sorts of edifices, are not sufficient; some practical rules for building frame, brick, or stone houses—such, for example, as a barracks or hospital—would add much of utility to this branch; and hints on the lighting, warming, and ventilation, would benefit the service generally.

This subject might be finely illustrated by examples from our recently erected public buildings built by the engineer corps, which have the merit of being constructed on modern principles and with the latest improvements.

Finally, the additions which are above proposed for the course are not so extensive as may appear at first; more changes than enlargements are required; and I estimate that in teaching the course indicated, in the manner prescribed, not more than six or eight weeks additional time will be found necessary.

These six weeks may be obtained for the purpose of discontinuing the teaching of engineering and drawing. At present three hours a day for six weeks are devoted to the drawing of a canal lock, resulting in the production of neatly finished plans, as well as the improvement of the class in ability to delineate their ideas, and to understand more readily those of others when thus presented. Still, I think that the cadet is well enough grounded in this respect before he arrives at this course, and that the additional time he is drilled on drawing is calculated rather to exhibit his proficiency than to teach him anything new. This will be apparent when the time devoted to drawing during the prior years is considered.

In the third class course, cadets draw for three hours a day during three weeks on descriptive problems, and, in addition, two hours every other day during the same year at topographical drawing; during the second class year, two hours every day are devoted to drawing; thus making in all an amount of time which is already more than commensurate with the importance of the subject; and I therefore consider the first class term of three hours a day for six weeks consumed in drawing a canal lock (and also the equal term of fortification drawing in the next course, which will be alluded to beyond) to be superfluous; and recommend that the whole of it may be suppressed for this reason, and the still stronger one, that room will thus be gained for the additions above enumerated.

The summary of the additions and changes suggested is as follows:

1st. To teach engineering according to the spirit of the profession in America.

2d. To teach it as practically as possible; preferring the use of maps, plans, models, and collections, and the oral method of instruction, and by practice with the instruments in the field, in certain parts of the course.

3d. All accounts of details and constructions to be derived from the

experience of this country ; and all information on foreign materials not in use here should be excluded from the course.

4th. Certain additions are recommended in detail.

Lastly, the course having been modelled on the above plan, should, by constant care, be kept posted up to the times, and exhibit a correct reflection of the state of the engineering profession in America.

### *Fortifications and Military Art.*

Having already observed that nine months, instead of four and a half, will be, after September, 1858, devoted to the study of military science, I have a few suggestions to offer on this head. It must be noted that this is a favorable time to make changes in the course as now taught, and that it will be much better to commence the new one on a different and broader basis than to take the present one, and add to it enough, on a different plan, to fill up the added time. I mean that what I propose will be on a different plan, and that, as it will not harmonize with the existing course, the latter had better be entirely remodelled.

What I understand with regard to the new programme, as planned by the professor of engineering, is as follows :

- 1st. The course of field fortification to remain as it is.
- 2d. The course of out-post service to remain also.
- 3d. The course of permanent fortification likewise.
- 4th. That there is to be added to No. 2 a foreign text book, possibly in French, on strategy and the art of war.
- 5th. To be added to No. 3 a course embracing the German system (so called) with one or two French and Dutch systems of the eighteenth century.
- 6th. Also a course of military history, embracing the campaigns of Frederick and Napoleon. This is entirely new.

The entire course, as now taught, is remarkable for the following traits :

- 1st. For ignoring the writings on fortifications and military science of the United States engineer corps.
- 2d. For not teaching the theory of American fortification.
- 3d. For not explaining the size, form, armament, and other elements of American forts.
- 4th. For teaching fortification as adapted to European States, instead of developing ideas suited to our enterprising people, immense territory, and extended sea-coast, with its wealthy ports, our railroads and telegraphs, rifles, and rifle cannon.
- 5th. A study of the art of war, such as it is found in foreign treatises, deduced from the practice of European States, with their different forms of government, large standing armies, and contiguous inland frontiers.

6th. The teaching of all the branches too abstractly, without referring for the derivation of general rules and principles to accounts of battles or sieges, or to existing or past permanent or temporary fortifications in this country or any other.

It is to insure the additions being taught in a different spirit, and

to procure the remodelling of the existing course to conform with the additions, that I offer my views on the subject.

The criticism above given of the present course is requisite, to prove that some suggestions are as much needed as I have already shown they will be well timed. To complete it, I should add that everything is now taught with too great attention to details; that there is too much time wasted by the cadets in memorizing feet and inches, and that the idea he must thus imbibe, that dimensions are all-important in fortification, is inconsistent with that reliance on general principles which should be characteristic of a graduate of the Military Academy.

With his mind stocked with general principles, the officer can turn his theory to practical use by referring for details to books. Hand books of information on all sorts of details of military and civil knowledge are at every one's disposal, and therefore there is no necessity for cramming the student with trifles of this sort; but general principles and self-confidence in selecting or originating a plan can only be gained (unless by experience in the field) by much well directed study and reflection.

No single year's course, however wisely planned, can be relied upon to impart to the student both the science of fortification and an acquaintance with its complicated details, and when the choice between the two is made, that least necessary will be found to be the one which teaches the dimensions and construction of those trifling parts which encumber text books on this subject, to the detriment of a broad consideration of the whole.

### *Fortification.*

On this subject I recommend, in the first place, a course of ~~history~~ of fortification, very brief, showing mainly that the art of defence has, at every epoch, from the earliest times, followed and been subordinate to the arms and means at the disposal of the attack.

This course will impress the reason as well as the memory of the student with the general principles of the art, especially when it is elucidated by plans and models of those places of which the sieges are described. It should teach the various systems of fortification, from the early ages, when the sling, bow, and battering ram, were all the defence had to resist, up to the present century, say to 1815.

All of these are interesting, and their study will aid in giving the student the habit of independent reasoning on the principles of the art. They become more necessary and practical as we approach the present century.

They should be explained critically, but very briefly, by dwelling on the important features, and avoiding details and accuracy of dimensions, and explaining them orally, and from drawings or models of existing or past real places, choosing in preference such as have been besieged.

On arriving at 1815, a second course must commence, one more particularly important and at the same time more difficult to treat. This is because the systems actually exhibited in fortified places built since that time are essentially different in principle, while the arms

(up to 1850) have remained the same, and also because the test of experience has not been sufficiently applied. To the merits of some of them, and any abstract reasoning on the subject, the student will, if he has profited by the previous course, be disposed to distrust.

To explain this period, the sieges which have taken place in it, especially those of Antwerp, Pampeluna, and of Venice and Rome, should be explained at some length; and here will be a proper place to discuss the attacks on forts and entrenchments which took place during the American war of 1812 and 1814.

The remaining part of this course is, though confined to a history of two or three years, with all the rest, both ancient and modern to an American student. It should contain a critical account of the sieges which took place during the Russian war, the sieges of Silistria and Sebastopol, the takings of Bomarsund and Kinburn, and the bombardments of Odessa and Sweaborg.

Much analytical reasoning should here be devoted to developing the theory of sea-coast defence, illustrating the subject by detailed accounts of the recent contests between forts, on the one side, and ships, or floating batteries, bomb vessels, and gun boats, on the other.

This entire course (which I have divided into three parts) will not occupy, if treated as prescribed, more than five months. Its study should be very brief and general at first, avoiding all details, becoming more thorough as it approaches the last era, where more care can be taken to place their value on those dimensions and proportions of works which appear to have influenced the duration of the defence.

Maps and models of the places described are requisite throughout the last part of the course, but for the first two parts of it drawings may suffice.

A course of similar lectures, with facilities for interchange of ideas between pupil and instructor, will be the proper mode of teaching this course; the interest of the pupil should be kept alive, and he should be led to study for the sake of improvement rather than, as is the case at present, for a high mark in the class. At this time it must be the tact of the instructor which shall give him a comparative estimate of the application and advance of each cadet, while, during other parts of the course, and on review of the whole, there will be ample opportunities for applying the present scale to assist in settling each man down to the exact level where his talents and application ought to place him in his class.

One point worth noting with regard to this course of history is, that since no two forts or localities described in it will be alike, the student will be insensibly imbued with general views on the subject of adapting fortifications to the topographical features of the locality, so that after having, in the second period of the course, studied the systems of the age in the abstract, he can the better appreciate the application of either in the third period, viz: the study of the theory and construction of the fortifications of the United States. He will also get an idea of the uses of fortification in different times and countries, for its objects have varied as much as the modes of fulfilling them. The Chinese wall was, in its day, as well conceived a fortification as are now the bastioned or casemated works which secure

grand stategetical points in France and Germany. A certain discrimination of this kind will be required to enable the student to comprehend whatever may be laid down as an American system, since the latter must, of necessity, be different in principle and practice from any foreign one.

#### SECOND PERIOD OF THE COURSE.

After the preparation specified above, the cadet should enter upon a study of the French and German systems, with the aid of models, of those French works which exhibit best the application of the pure bastion method, and of those German ones which are the best types of the Carnot and Montalam best systems, either separately or conjoined.

He should also examine the system proposed by the French engineer Chourmara, and the views of at least one American officer; both of which, though neither is as yet recognized and acted upon in actual constructions, are conspicuous for bringing common sense to the solution of the few problems presented in the question of how to restore the equilibrium between the attack and defence.

This part of the course should not consume more than a month, for in its study all details should be omitted, and feet and inches insisted on in those cases only where the carrying out of a principle depends on the dimensions being closely measured; besides, the student is now capable of seizing without difficulty the peculiarities of each system, of approving the good points, and condemning impartially the bad.

The critical account of these European systems should be written by an American engineer officer, because, in foreign works on the subject, we do not meet any writings inspired by the desire to sift fairly their relative merits. The French and German schools are each pledged, by national considerations, to offer to the defences of their respective States all the prestige that reasonings from the closet and paper attacks can give.

This second period of the course is the indispensable basis on which I propose to found an exposition of the theory of American fortifications as it is, and a speculative discussion on what it will be now that the dogmas on which it has thus far securely rested are unceremoniously struck down by the novelties in arms, projectiles, vessels, and means of communication, which were elicited so suddenly, and on so large a scale, by the Russian war.

#### THIRD PERIOD OF THE COURSE.

##### *American fortification as it is and as it will be.*

At the Military Academy there is hardly any instruction given on the subject of sea-coast defences, to which branch of the science American fortification is pretty much limited—certainly all that is taught on this head is taught in two lessons and is not worth specifying. The theory and practice of American defences are substantially ignored: not a word is said of railroads and telegraphs as affecting the

system adopted, and not a single American work is adduced as an example, described, or alluded to in any way.

To remedy this great fault of omission, I submit the following plan, being a course in two parts :

The first part should comprise a study, aided by maps and models, of all the fortifications of the United States now built or in progress. There are two reasons for this: they are scientific and well adapted to the site, locality, and the genius of the people; they are also for different purposes and on a different principle, with some exceptions, from those of other countries, and the theory of them cannot be developed by the study of any foreign ones.

2dly. In the event of a war, it will be of great advantage, in the defence of any fort, to have its officers, from the commander down, perfectly acquainted, not only with the importance of the position, but as capabilities and the theory of its defence.

This desirable state of things does not exist now, as I confidently assert, and the defect is, in my opinion, owing to a certain disgust for the science which the officer contracts while passing through the Military Academy, and to the omission above specified.

I have stated that the theory of fortification in this country cannot be elucidated by the study of any foreign forts or books; as this is not self-evident, a brief comparison in support of it may not be out of place.

Our people have no fears of invasion, and, so far from building forts for the defence of the soil, anticipate a constant and accelerated expansion of territory.

In this we differ from foreign nations, whose history teaches them that a fortified land frontier, an impregnable capital, and a large standing army, are indispensable to their possession of the soil, or even their existence as a separate people.

But however secure we may be on this point, we must foresee that in our next war, the steam fleets, floating batteries, and gun-boats, of France and England, may be directed against our sea-board cities; that the consequences of defeat would be the ruin of the navy yards, the loss of the naval and merchant fleets, and of the tribute expected from the cities whose defences are forced. Also, that the point of retreat, lost to our vessels, is a proportionate gain to the enemy, who may so strengthen himself there as to retain it as a rendezvous to sally from either against our commerce or to make a combined attack on a neighboring city.

On the other hand, taking the case of England, a difference appears, not so much in the requirements of the problem as in the mode of fulfilling them.

The wealth of England is gained in commerce or extracted from her foreign possessions, and hence she is obliged to maintain an immense navy, which is more than adequate to the protection of her coast; her wooden walls are now, as in the time of Napoleon I, the safe-guard of her wealth at home as well as abroad. Hence, the coast defences of Britain are trifling, and the few strongholds she possesses, dispersed over the world, are intended for purposes entirely different from those which our forts, with one or two exceptions, must subserve: the



depots and rendezvous for her navy and privateers, at points distant from home or stations on the routes to her foreign dominions, or finally they are placed in menace at the doors of a rival power, (Malta, Gibraltar, and Aden, are examples of the first two, and the Bahamas, Bermuda, Barbadoes, &c., of the last description of places.)

Without pushing the comparison any further, it may be stated that the works of France are generally of a much older date than ours, and hence, even where they answer similar purposes, do not illustrate as well the theory of a sea-coast defence. From Russia we may probably draw some useful ideas; but, by all means, let the student learn first what has been done at home. And here it must be noted that, up to this time, the entire theory of fortification inland, as well as sea-coast, has been explained without referring to any plans or models of any fortifications of this country or any other.

In order to teach fortification as it is, and not as an abstract science, its theory should be drawn from examples (and sufficient reasons are given above for the selection of those examples from our own country) in that part of the course which treats of its peculiar necessities and modes of defence.

These examples should be presented by modes on a scale large enough to give a good idea of the features of the works, and by plans which shall take in the entire field of action of their guns.

The existing American system will be developed by the <sup>above</sup> method without much need of demonstration; it does not adhere blindly to the dogmas of any foreign school, for our chief engineers and boards of officers have been imbued with the true spirit of the profession and their works exhibit the elements and combinations of the French and German schools, either purely or mixed together in the same work, as the nature of its site, its locality, its purpose, or the particular theory of its defence, may require.

### *American fortification as it will be.*

Necessary as it is that our Military Academy should teach the theory of the existing American system of fortification, it is nevertheless true that this system will not suffice to guide the works which may be constructed during the military period which has just dawned.

For example, take the French or pure bastion system, mainly according to which Paris is fortified, which is followed in many of our forts, and which is being taught at the Military Academy with such close adherence to the orthodox creed that its dimensions are insisted on to eighths of an inch.

The basis on which rest all the dimensions is the range of the fire-arm which defends it; the one in use until lately was the wall piece, a weapon which has been entirely superseded by the rifle with its elongated hollow ball, whose effects are much more deadly, and at a range four times as great as that of the former.

Our sea-coast defences are even more decidedly affected by the changes in the weapons and means of war than the inland works to which the bastion system is most appropriate; they must, in the next ar, prepare to resist those floating batteries which, clad in armor,

(proof against the missiles which have hitherto been the terror of fleets,) demolished the fortress of Kinburn.

Bomb-ships of great destructive range, such as those used at Sweaborg, will hereafter form an important part of an attacking flotilla, and steam gun-boats will, by their skirmishing attacks, distract the attention of the defenders from the breaching fire of the floating batteries.

The fleets of ships-of-war, to guard against which all our forts have been devised, will not probably again be used in war except against other fleets, or to bring up to their positions of attack the unwieldy floating batteries, or to act as their tenders, to supply men, ammunition and provisions in a protracted attack.

The attack of a sea-coast fort will now, in fact, assimilate closely to the siege of an inland work; the consideration of the elements which will henceforth be involved in the problem will make this clear; and it must be admitted that the new necessities of the case demand new dispositions to meet them. To expect that a science will remain stationary while its elements expand so rapidly is an indication of prejudice or a want of reflection.

I therefore suggest that a new American system of fortification, adapted to the requirements of the age, be written out by some capable hand, and that it be adopted as a part of the course of engineering at the Military Academy.

*Strategy and the art of war.*—At present two weeks are devoted to the study of the above subject. The text book is a condensed compilation of foreign treatises on the subject, and the fault common to all the other branches of the year's course is conspicuous in this, viz: neglecting to derive or at least support general principles from examples.

In the enlarged course it is contemplated to teach some campaigns of Frederic and Napoleon and a foreign text book on the art of war on a large scale.

The sources from which the present text book is drawn, and which will furnish the additions, are altogether foreign; they were also written before the present era of innovations, and of course none of them touch upon that sort of warfare and military service which are peculiar in our Indian or sea-coast frontier.

Nearly all our army is occupied in guarding the former, and when the graduate joins his company he is detailed immediately on active service, when he finds that he has not gained at the Military Academy any ideas which will supply in part his want of experience. The circumstances in which he is thrown and his first military duties are perfectly novel to him, and he cannot refer for information on them to books, because there are none on the subject. There should therefore be written a manual of instruction for young officers; it should explain the duties of subalterns in our service, so as to enable them to join their companies with some ideas of what they are expected to do, and giving them some rules to follow in the execution of their duties: for example, how to provide provisions, clothing, &c., for a march, how to journey over the plains, to encamp, to care for the travelling condition of men and animals, to fight or treat with the

Indians ; all these the officer learns from experience alone, at a disadvantage to himself, and to the detriment of the service, from the blunders he commits in acquiring his experience.

With regard to military history (the campaign of Frederic and Napoleon,) as it is inseparable from general history, and as it must be studied as a part of the latter in a previous course (that of ethics,) it appears unnecessary to consume any time with it in the present one. As, however, the Russian war will not probably be included in the course above referred to until time has rendered it classical, a condensed history of it will be necessary, in illustration of whatever modern principles of warfare that may be inculcated.

The numerous examples from the campaigns of Napoleon that are indispensable to this course, may be referred to by the aid of maps without much preparation, for there is no reason why the cadet should not have a proper acquaintance with them before arriving at the last year's course.

With regard to the unwritten art of war, or those principles which have developed themselves since all the present text books were written, there is more of importance in it than in any exposition of the art as it existed in the times of Frederic or Napoleon, either of those epochs being as distinct from that in which we live as from each other.

The last war has demonstrated that the magnetic telegraph and the introduction of steamships and railroads have greatly changed the principles of warfare ; and the long range rifle and the improved cannon have had a great effect in modifying them.

All the rules of strategy and warfare must be altered to suit the new order of things ; and it is a brief essay on modern war which ought to form the chief part of this course. An important feature of this should be a chapter or two demonstrating the existing reciprocal support which fortifications, active armies, and fleets, lend each other, and the theory of the defence by fortifications, the regular army, and the militia and volunteer troops of the sea-coast frontiers of the United States should be carefully elaborated.

Though the above programme appears at first extensive, still, considering that history is here only referred to and explained from maps by the instructor, and not to be recited by the cadet, (except the short account of the Russian war,) and since the principles of strategy are few and simple, and the practical treatises recommended need be but very concise, the student may be sufficiently instructed in the elements of the course of the art of war, &c., in one month.

*Synopsis of proposed course of engineering.*

Second class year :

Civil engineering, total.....	4½ months.
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First class year :

A.—Fortification. (a.) 1st period, history of field and permanent works: 1st part up to 1815 ; 2d part up to 1850 ; 3d part up to 1856.....	4	“
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(b.) 2d period. Discussion of existing systems ; fortification and of two theoretical ones.....	1 month.
(c.) 3d period. American fortification, field and permanent, as it exists, and as it will probably be during the current military epoch.....	3   “
B.— <i>Art of war, &amp;c.</i> (a.) Manual of instruction for subalterns ; (b.) History of the Russian war, (brief, especially as the sieges have been described above ;)	
(c.) a brief treatise on the art as deduced from Napoleon's campaigns ; (d.) one on the art as it will probably be during the present epoch.....	1   “
Total.....	9   “

NOTE.—Prepared for the use of the Board of Visitors of 1857, at the United States Military Academy, and respectfully submitted to them by

JAS. ST. C. MORTON,  
*First Lieutenant Corps of Engineers, U. S. Army.*

JUNE, 1857.

#### RIVERS AND HARBORS, ETC.

Of the works of river and harbor improvement under the charge of this department, only such as have been prosecuted during the past year are noticed in the special reports which follow.

The control of the works for “reopening a communication between Albemarle sound and Atlantic ocean,” “improving the Cape Fear river,” and “removing obstructions to navigation in the mouth of the Mississippi river at the Southwest Pass and Pass à l’Ostre,” has been transferred to the topographical bureau by the direction of the War Department.

*Improving the Kennebeck river from the United States arsenal in Augusta, Maine, to Hovejoy's narrows ; in charge of Captain John D. Kurtz.*—The operations of last fall were restricted to blasting a rock near Naumkeag island, and resulted in deepening the channel upon it to six feet nine inches at the lowest tide, and fourteen feet at high water. The balance on hand and the means resulting from the sale of machinery, &c., have since been applied to removing troublesome and dangerous rocks from Gage shoal, Governor's Grave shoal, Brett's shoal, and Hinckley's point, and operations have been closed for want of funds.

The result of the application of the appropriation of \$6,000, made for this improvement in 1852, has been to afford a channel from the United States arsenal at Augusta to the south line of Hallowell, free from the dangerous rocks, snags, &c., which previously obstructed it. To make the navigation from Sheppard's wharf to Hallowell and

Augusta as good as it now is below that point will require an expenditure of about ten thousand dollars.

*Protection of the Great Brewster island in the harbor of Boston, in charge of Colonel S. Thayer.*—No operations have been undertaken since September, 1854, for want of funds. The work, which in its present unfinished state, falls short of accomplishing the object designed, and is moreover exposed to be severely injured by gales of wind, should be completed at once. An appropriation for this object is urgently recommended.

*Protection of Lovell's island and sea-wall on Deer island, Boston harbor, Massachusetts, in charge of Colonel S. Thayer.*—The walls built for the protection of these islands need repairs, for which no funds are available.

*Improvement of the Patapsco river from Fort McHenry to mouth of said river, in charge of Major H. Brewerton.*—Operations were suspended last year on the 15th December, and resumed this year on the 21st of May; the very boisterous weather in the spring preventing the laying out the channel at an earlier date. Both sides of the new channel were buoyed out this year—the eastern side with red buoys and the western side with white. Two new steam dredges with eight dumping scows and one steam tug have been added to the working apparatus this year, making the present force to consist of three steam dredges, twelve scows, one lighter, and one steam tug. The quantity of matter removed from the line of the new channel the last season, to include the 30th of September, is 80,150 cubic yards.

Balance in treasury October 1, 1857.....	\$38,000 00
Probable amount to be expended by June 30, 1858.....	38,000 00

*Removing obstructions at the mouth of the Susquehanna river, near Havre de Grace, Maryland, in charge of Major H. Brewerton.*—For the reasons stated in former reports, no progress has been made in removing obstructions in this river.

*Improvement of the Appomattox river, below the city of Petersburg, in charge of Colonel J. L. Smith.*—The city of Petersburg having purchased a powerful dredging machine, and entered into a contract with the United States to deepen the channel, the work done during the several months they have been engaged upon it must be considerable, and sufficient perhaps, or nearly so, to absorb the unexpended balance of the appropriation. No settlement on account of the contract has yet been made, and no report respecting the work has been received recently.

*Improvement of the harbor of Charleston, South Carolina, in charge of Captain G. W. Cullum.*—Operations toward the opening of Sullivan's island channel under the contract between the United States and the commissioners of the fund appropriated by the State of South Carolina, referred to in my last annual report, were commenced in

February last, and have been as steadily prosecuted as the unfavorable nature of the late working season and the imperfections incident to a new and hitherto untried machine would permit. The progress of the work and the results obtained have been very satisfactory, a sensible impression having been made on the shore constituting the bar of this channel, thereby much facilitating the passage of vessels through this entrance to the harbor. At the present rate of progress the channel might be opened in about a year; or by the substitution of certain new machinery in the dredger, the work might be accomplished in five or six months. The balance of the appropriation still available is, however, only about half sufficient for this object.—(For report of officer in charge, &c., see appendix A.)

*Removal of obstructions from Savannah river, below the city of Savannah, in the State of Georgia, placed there during the revolutionary war for the common defence, in charge of Captain J. F. Gilmer.*—Early in the month of October, 1856, the work of dredging was resumed at the upper part of the wreck bank, where a sand bar had formed, filling, to some extent, the excavation that had been previously made by the machines; when this was removed, a greater width was given to the channel way dredged through the wrecks, making the total passage about three hundred feet wide, as proposed in the plan of the commission. Having perfected the dredging at this point, and at others in the vicinity, a revolving drag, attached to the tow boat, which had been used for towing mud flats, was worked along the excavated channel to give uniformity of depth, while the engineer of the dredge, assisted by a part of the crew, was employed in making essential repairs to the machinery preparatory to future operations. The results obtained by means of the revolving drag have been very satisfactory; *first*, by giving great uniformity of depth, and *second*, by gaining a small increase in depth of channel at all points over the obstructions. At the close of this operation, the soundings showed that there was no point of less depth than *twelve feet* at mean low water; or full *eighteen feet* at mean high tide.

Under authority from the War Department, the dredge, tow-boat and flats, with the working force, have been employed in excavating a channel through the “knoll” off Cockspur island; and all current expenses and wear and tear of machinery, were paid by the city of Savannah. Satisfactory results have been obtained at this point, and a few weeks’ work during the calm weather of next summer will give the desired depth and width of channel through this obstruction.

Arrangements have also been made for the delivery of timber and other materials required for the construction of the deflecting work just above King’s island, and the dredging machine has removed in part the southern edge of Garden bank.

During the coming year, the construction of the work above King’s island will be pressed forward, with a view to get an increased flow of water down Front river at the earliest practicable day, as this is all important to the preservation of the channel which has been excavated through the wrecks. The dredging machinery will be em-



ployed in removing the shoals in Front river at the points indicated in the report of the commission, February 11, 1853.

Balance in treasury October 1, 1857.....	\$83,000 00
Probable amount to be expended by 30th June, 1858.....	83,000 00

*Improvement of the river St. John's, Florida, in charge of Captain J. F. Gilmer.*—A resurvey of the entrance was made, under an arrangement with the Coast Survey office, to determine the character of the changes which had occurred during the past year; but with the small means available for this work, no other operation has been undertaken since the last annual report. A proposition has, however, been recently made for maintaining for a time a depth on the bar which will accommodate the class of vessels at present employed in the trade of the river, and a contract will probably be entered into on the terms offered, which do not exceed the means at disposal.

*Repairs of the United States sea-wall at St. Augustine, Florida, in charge of Captain J. F. Gilmer.*—The three or four coping stones, displaced by storms from the main wall, and a portion of the coping on the walls of the basin near the market, have been reset, and some minor repairs to the work made during the past year. Generally, this wall is in good condition, and requires no further immediate expenditure.

*Improvement of the harbor of Mobile, Alabama, at Dog river bar and the Choctaw pass, in charge of Captain D. Leadbetter.*—As no funds were available for the preservation of the machinery belonging to this service, it was, in compliance with orders from the Secretary of War, sold on the 15th of October, 1856. The net proceeds of the sale were \$1,082 82, the greater part of which has been applied in the payment of liabilities incurred on account of the work. No work has been done during the past year except the removal of six or eight snags from the channel. The superintendent urges the importance of continuing this improvement. (For report of officer in charge, &c., see appendix B.)

## APPENDIX A.

WASHINGTON, D. C., October 20, 1857.

GENERAL: I have the honor to submit, herewith, my annual report for the improvement of the harbor of Charleston, S. C., for the year ending September 30, 1857.

After interminable delays, for which, as you are fully aware, I, the engineer in charge, have been in no manner responsible, the opening of Sullivan's island channel into Charleston harbor was finally commenced in February last, under the contract of July 11, 1856, with the commissioners appointed by the State of South Carolina "for the examination and improvement of the port of Charleston." Owing to stormy weather, inexperience in working the new dredging ma-



chine, and frequent breakings of its suction-hose, little was accomplished till June; since which, with short intervals, the work has steadily progressed, and the success of the novel process of dredging, which has been adopted, fully tested, and established. The whole amount of dredging accomplished to the 30th ultimo has been 21,482 cubic yards, the maximum day's work being 1,005 cubic yards, and the averages for June 388, for July 347, for August 266, and for September 538, or a general average of 328 cubic yards per working day. The operations have been confined chiefly to removing the part of Drunken Dick shoal which obstructs the western entrance to the channel. A very sensible impression has been made upon this shoal, and the passage of vessels in and out much facilitated. The materials removed from the channel are sand, broken shells, and occasionally post pliocene clay.

A brief description of this new dredging machine may not be out of place. It consists of a large centrifugal pump, six feet in diameter, revolving upon a vertical axis, to which an iron 19-inch suction hose is attached, its lower or bell-mouthed end resting upon the bottom of channel. The pump is placed in the centre of a powerful propeller (where there is the minimum disturbance by the winds and waves) immediately under its deck in the hold of the vessel, and is worked by an engine supplied with steam from the propeller's boiler. The dredged material comes up in the form of very fluid mud and escapes at the circumference of the pump into the hold or well of the boat where the solid matter, about 20 to 25 per cent., is deposited, the water and two or three per cent. of sand escaping by the bow and stern overflows. When filled, the pump is disconnected and the steam turned on to the engine, and the steam engine used to propel the vessel to the place of deposit—Cummin's Point—a mile and a half distant. The deposition is easily effected, the bottom of the well being formed by shutters, which, when opened by a simple arrangement, allow everything to run freely out.

This simple and admirable machine—the only one, according to my experience, suited to work in a rough sea-way—was invented by Mr. Lebbby, of Charleston, S. C. Upon first seeing its model in 1855, being satisfied that it was constructed upon correct hydraulic principles, I expressed myself then, and often since, sanguine of its ultimate success, though I thought prudence dictated its trial in a rough sea upon a larger but inexpensive scale. So satisfied, however, were its proprietors, Messrs. J. M. & T. D. Eason, of its adaptability to dredging, confirmed by my approval, that, without further trial, they built the dredging machine now in use at a heavy outlay; and, conquering all obstacles, are now reaping the reward of their perseverance and enterprise.

The power of the machine is so great that bricks, cannon balls, roots, bits of wrecks, and concreted sand and shells have been readily pumped up from the depth of twelve feet.

At the present rate of dredging the channel will be opened in about a year. By substituting a larger pump, which could be worked by the same engine, and economizing power by some slight modifica-

tions of the machine, the whole work might be executed in five or six months.

In my report upon the "preservation of the site of Fort Moultrie," I have renewed my application, made every year since I have had charge of the public works in Charleston harbor, for an appropriation of \$10,000 for building up the necessary parts of the existing jetties, particularly the inshore end of Bowman's. At the same time I propose removing, to the depth of 16 feet at low water, the extreme outer end of Bowman's jetty, which partially obstructs the western entrance into the channel. Both of these operations would tend to throw a larger volume of water into the channel, and aid, when once thoroughly dredged out, in keeping it open; but they should be done cautiously, and their effects most carefully watched by the engineer in charge.

The balance now in hand of the appropriation by Congress will complete about half the dredging. This great and important improvement, so necessary to the commerce of the south, I trust, will be completed by the close of another summer, and the city of Charleston finally attain the consummation of its long cherished hopes.

Respectfully submitted.

GEO. W. CULLUM,  
*Captain United States Engineers.*

Brevet Brig. Gen. JOS. G. TOTTEN,  
*Chief Engineer, United States Army.*

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## APPENDIX B.

MOBILE, September 30, 1857.

SIR: I have the honor to submit the following report relating to the improvement of Mobile harbor, by dredging at Choctaw Pass and Dog River bar, for the year ending September 30, 1857.

As no funds were available for the preservation of the machinery belonging to this service, the department had authorized its sale at the date of my last annual report. The whole was disposed of at public auction on the 18th of October last. The net receipts of the sale were \$1,083 82, the greater part of which has been applied in the payment of liabilities incurred on account of the work:

No work has been done during the year except the removal of six or eight snags from the channel.

The bay of Mobile is accessible to the largest merchantmen, which are compelled to lie in the lower part of the bay, and receive and discharge cargo by means of steam lighters communicating with the city.

The depth of the water in the lower bay, and thence approaching the city through a distance of twenty miles, is sufficiently good, for it is not proposed at present to improve the channel for ships of heavy draught. But at seven miles from the city, at the lower part of Dog River bar, the depth becomes and continues less than 12 feet to the city, presenting a formidable obstruction to vessels of the coasting trade, as well as to those engaged in the export of lumber and naval stores.

In favorable tides a draught of 10 feet can be carried over this bar, but in the prevailing northerly of winter scarcely 7 feet. In order to give a channel 300 feet wide and  $12\frac{1}{2}$  feet deep throughout this distance of seven miles, it will be necessary to remove by dredging 868,929 cubic yards of mud. This can be accomplished in two years, by two dredges, each raising 20,000 cubic yards per month. The average depth to be dredged will be about 2 feet, and the cost will be as follows:

Two dredges, at \$30,000 each.....	\$60,000 00
Eight scows, at \$2,000 each .....	16,000 00
Dredging 868,929 cubic yards, at 20 cents.....	173,785 80
Contingencies.....	10,214 20

Making a total cost of ..... 260,000 00  
for the improvement proposed, and for this sum the work can be done.

The prosecution of this improvement is urgently demanded by the interests of the State and of the general government.

As before remarked, it is not proposed to open a channel deeper than is absolutely required in the coastwise and lumber trade. The State requires it for the accommodation of her import trade, which is mostly brought here coastwise, and for her exports in lumber, naval stores, &c., which are carried in vessels of the same class. She requires it for the development of excellent coal mines, which have hitherto laid untouched, because, among other reasons, coal cannot be lightered and transhipped like cotton. She demands it as due to the magnitude of the exports of Mobile, which amounted for the last year to \$33,000,000. The return imports, it is true, are mostly *entered* at the port of New York, but they are brought hither in vessels of 12 feet draught, and the State of Alabama asks for such improvement of the channel in question as will give those imports free access to the port of Mobile. Even the sea-going steamer which runs regularly from this city to New York is compelled to lie below the bar, at great expense and inconvenience.

The improvement of the channel will give life to the commerce of the port, develop the resources of the whole dependent interior country, and repay the general government tenfold in money and material resources.

As a harbor for heavy ships-of-war and armed steamers the bay is unsurpassed, and under the guns of its forts in time of war these ships will look with certainty for protection, for fuel, and for all other supplies. The railroads now under construction, connecting Mobile with the interior and the great northwest, will make the resources of that region available at Mobile for either peace or war. I conclude that it would be wise and just to perfect the channel of the bay to the moderate extent proposed and begun, wise on the part of the general government, and just to the States of Alabama and Mississippi.

Respectfully submitted.

D. LEADBETTER,  
*Captain of Engineers.*

General JOSEPH G. TOTTEN,  
*Chief Engineer, Washington.*

*Annual report of the operations upon the Washington aqueduct during the year ending 30th September, 1857.*

At the date of the last annual report, 30th September, 1856, the works of the aqueduct had been suspended for want of funds.

The appropriation of the previous session had been confined by Congress to paying off existing liabilities, and to the preservation of the work before done from injury.

This suspension of operations continued until Congress, on the 3d March last, by an appropriation of one million of dollars, provided the means for carrying on the work.

Most of the engineers who had been employed in the construction of the work before the suspension of operations had been retained, attending to the preservation from injury, of the work already executed, and engaged in perfecting the plans and details of the various structures upon the line, and in arranging and condensing from the records information in answer to questions of Congress or of its committees.

Very full information, in regard to the work and the estimates will be found in the last annual report, printed with the President's message and documents, 1856-'57, vol. 2, page 346, in Ex. Doc. 82, H. of Reps., 34th Congress, first session; and in Senate Ex. Doc. 48, 32d Congress, second session, which contains the original report and estimates upon which the work was ordered by Congress. Referring to these documents for a more particular information as to the plan and construction of the work, I proceed to give an account of the operations of the past year, and of its present condition.

Immediately upon the passage of the appropriation, advertisements were extensively published, calling for proposals for contracts for graduation, for reservoirs, for masonry, and materials of conduit and bridges, for cast iron pipes, &c.

The law of contracts, requiring for all contracts in the District advertisement of at least sixty days, deferred the times at which the bids received could be opened, according to law, to the 7th of May.

In order not entirely to lose the spring, which is the best season for work in the unhealthy valley in which the aqueduct is built, a force was collected, under direction of the engineers, and set to work upon some of the more difficult parts of the line with the least possible delay.

Work was commenced upon the government quarry at Seneca, from which most of the cut stone for the culvert and bridges, abutments, and end walls, is procured.

Sections one and two, which embrace some very difficult and expensive loose rock and earth work, and which had already been partly constructed by the government, were commenced. The unfinished culverts, abandoned by contractor Duffin, and partly built late in the fall of 1855, were completed; and work upon section thirteen, abandoned for want of funds, was resumed. Contractors Decker and Gallaher were notified, on the 5th March, to resume work upon their contracts, and to push it with all possible vigor.

There was great competition for the contracts under the advertisement of the 5th March.

About seventy bids were received in all. They were opened in presence of the bidders on the 7th May.

The analysis and comparison of the bids occupied some days, and it was not until the 26th May that the Secretary of War awarded the contracts to the lowest bidders, as follows, viz :

Contract for graduation on sections fourteen and fifteen, to Myers, Jones & Pratt.

Contract for conduit on sections three to thirteen, inclusive, to Henry Cady.

Contract for graduation on sections fourteen and fifteen, to Carman, Dobbins & Co.

Contract for receiving reservoir, to Daniel Stone.

Contract for distributing reservoir, to Reilly & Cochran.

Contract for bridge No. 3, to McDonald & Piper.

Contract for cast iron pipes, branches and bends, to C. B. Cluskey & Co.

Contract for cut stone, to Myers, Jones & Pratt.

Contract for bricks, to William Douglas.

Contract for sand, to G. W. Jackson, in part ; to R. F. Jackson, for the remainder.

Myers, Jones & Pratt signed the contract awarded them for graduation, but declined to sign that for cut stone ; and, on the 24th August, a contract was entered into with Messrs. Frederick & Field, the next lowest bidders, for cut stone.

Messrs. C. B. Cluskey & Co. having failed to sign their contract for cast iron pipes within the time prescribed in their bid, a contract was entered into, on the 6th August, with Messrs. J. W. & J. F. Starr, the next lowest bidders, for iron pipes.

Messrs. Reilly & Cochran declined signing the contract for the distributing reservoir awarded to them; and as difficulty in regard to the titles to the lands upon which it is located prevented the work being commenced, and the next lowest bidder also declined signing a contract according to the terms of his bid, holding himself freed by the award having been first made to another, no contract has been made for this reservoir.

Messrs. McDonald & Piper failed to offer satisfactory security for the contract awarded them for bridge No. 3, and no contract has been made for this work.

The contracts which were signed and executed, therefore, under the advertisement of 5th March, 1857, are :

For graduation, with Myers, Jones & Pratt.

For conduit, with Henry Cady, and with Carman, Dobbins & Co.

For receiving reservoir, with Daniel Stone.

For cast iron pipes, branches and bends, with J. W. & J. F. Starr.

For cut stone, with Frederick & Field.

For bricks, with William Douglas.

For sand, with G. W. Jackson and with R. F. Jackson.

Copies of these contracts accompany this report. All the old contracts will be found in Doc. 82, 34th Congress, first session.

The delay occasioned by the sixty days' advertisement required by law, and by the time consumed in making and executing the contracts, caused the commencement of the work by the contractors to be deferred until the advent of the hot months and the beginning of the sickly season on the line.

The consequence has been a very unsatisfactory progress with the work. Men were scarce, hesitating to go upon the line, where they suffered from malarious diseases; and, as the public works of the country were generally in a prosperous condition, they found ample employment elsewhere.

The work carried on by the government was prosecuted with activity until July, when it, too, began to feel the effects of the bad reputation of the work for health.

The financial revulsion of October, stopping most of the railways in course of construction, set free a large number of hands just as the healthy season upon the aqueduct commenced.

Efforts have been made to compel the contractors to take advantage of this supply of labor; and finding that they were deficient in means or energy to make proper provision for an increase of force before the setting in of frost should put a stop to all works of masonry, shanties or boarding houses have been constructed at various points of the line by the government, and the work commenced, with a view of doing a part of it by day's work, and turning it over to the contractors whenever they come forward provided with the force and the means to carry it on without delay.

All this has thrown additional labor upon the engineers, who have been thus compelled to make the preparations for beginning work which ought to have been begun by the contractors.

Contractor Decker having failed to collect such a force as would insure the completion of his contracts within a reasonable time, though notified early in March and repeatedly urged during the spring to push his work forward as required by his contract, he was notified, in the beginning of August, that his contract for culverts and for graduation were forfeited.

A force was collected with the least possible delay, but with great difficulty, in the midst of the sickly season, and, by great exertions, the work upon culverts and graduation under his contract has been so far advanced as to give assurance that it will be entirely completed before the setting in of winter.

Work on the tunnels was almost entirely suspended during the summer, owing to the difficulty of inducing miners to work on the line during the hot and unhealthy season. There is now, however, a large force employed, and all the tunnel headings but one are fully manned.

The present condition of the work is as follows:

A strong force is employed at the Seneca quarry, quarrying and cutting stone for the masonry of the culverts, bridges, waste weirs, dams, &c.

At the Great Falls a small force is employed in moving stone to the dam; and therein excavating at the head of the conduit, and preparing for building the masonry abutments of the dam. A third



gang is employed in excavating the deep pit of the gate-house, which is in solid rock.

The portion of the conduit which leads from the entrance on the river, under the Chesapeake and Ohio canal, to the gate-house is completed.

Upon section No. 1 tunnel No. 1 is about one-third finished. Tunnel No. 2 is about one-half excavated.

Below tunnel No. 2, on section No. 1, there are about 1,806, and on section No. 2 about 800 feet of masonry conduit completed.

The culverts from the Great Falls to the District line, twenty-two in number, are all so far completed that the embankments over them have been carried nearly up to grade, except No. 18, which has just been commenced, having been delayed on account of difficulties in obtaining title to the land on which it is built. This title has only lately been perfected, and the culvert which has been begun will be completed this fall.

One culvert in the District of Columbia has been begun, and is nearly completed. Its arch is closed, and the embankment over it is being made.

The other culverts in the District, three in number, are yet untouched, owing to difficulties in obtaining good titles to their sites.

Nearly all the heavy embankments outside of the District of Columbia have been raised within a foot or two of grade; and if Congress will pass a law, much needed, by which lands for the aqueduct can be taken on appraisement within the District, as they were for the Chesapeake and Ohio canal, and have been for the aqueduct itself within the limits and under the law of Maryland, all the embankments can be finished in the course of the spring, and water introduced into the city from the stream which flows into the receiving reservoir in the course of next season.

Without such a law I see no prospect of obtaining title to some tracts of land in which minor heirs are interested, and to certain others where the owners refuse all reasonable prices which have been offered, or where the titles are imperfect on the records.

A law of Congress prohibits the expenditure of money upon any site before the opinion of the Attorney General has been given that the title is good.

Upon the receiving reservoir the contractor, Daniel Stone, is now at work with a considerable force; but he has not made as much progress as was desirable, having suffered from the scarcity of hands during the sickly season. It is expected, however, that he will be able before winter to get in the masonry of the sluice which drains the reservoir; and when this is done, the work of the earthen dam can be carried on in any moderate weather during the winter.

The iron gates for the gate-house at the falls, and for the sluice through the dam of receiving reservoir, and that for the auxiliary pipe vault of the distributing reservoir, have been built and are in store.

A considerable quantity of iron pipes have been delivered under the contract of Messrs. F. W. and F. S. Starr.

The first contractors for bricks have availed themselves of the joint



resolution of the 4th of March last, which provided for releasing them from their contract and paying their losses. New contracts for ten millions of bricks were entered into with Mr. Douglas, and a large number of bricks have been purchased from other parties, and delivered along the line of the canal.

As it is evident there will be a great difficulty in procuring a supply of bricks sufficient to carry on the work with vigor next spring, search has been made for quarries of stone suitable for building the conduit. A number of quarries have been found and opened at points convenient to the line, which furnish a material that, with economy, will replace brick in the construction of the conduit.

These quarries will be worked throughout the winter, and when the spring opens a large stock of materials will be on hand. Cement has been ordered from New York, and is being stored along the line as fast as received, in order to have a supply on hand at the opening of the spring, as the season for building begins here before the opening of navigation on the Hudson river permits the shipment of cement.

Bridges Nos. 1 and 2 have been commenced, the foundations laid, abutments built, arches turned, and the superstructure carried up a little above grade. It is probable that they will be finished this fall; if not, they can be completed early in the spring.

At bridge No. 3 a boarding house has been built, the timber for centreing provided, and the foundations have been excavated. Some stone and sand are delivered, but the masonry is not commenced.

At bridge No. 4, over the Cabin John, the centre has been framed, and is now being erected. The excavation for the foundations of the abutments has been nearly completed, and a portion of the foundations will be put in this fall.

The stream has been dammed, and the pool thus formed communicating with the Chesapeake and Ohio canal, permits the large quantity of materials—stone, cement, sand, and timber—brought from a distance to be boated to the site of the bridge, and hoisted from boats directly into the work. This will effect a great economy of time and labor in its construction.

Besides the making of contracts, building of boarding houses, stables, shops, providing of boats, &c., for the accommodation of hands and the transportation of materials, preparatory works for the bridges, &c., which have occupied the greater part of the season, the principal items of work accomplished during the season have been as follows:

Rock excavation.....	9,963 cubic yds.
Earth excavation.....	63,135 "
Earth embankment.....	57,119 "
Puddling.....	2,985 "
Ramming.....	24,293 "
Stone masonry.....	2,128 "
Bricks laid.....	1,267,468
Bricks delivered.....	2,122,169
Sand delivered.....	102,994 bushels.
Stone quarried and boated to the vicinity of the work.....	1,530 perches.

599 lineal feet of tunnels have been pierced, and  
2,741 feet of conduit laid this season.

These quantities are not large; but the appropriation of Congress was made at a time when the work was entirely suspended; and had been so for months. It was necessary to gather and organize a force, to provide materials, and make contracts, which, under the operation of the law of contracts, required about four months.

These delays threw the beginning of the work into the sickly season, and both the government and the contractors had to contend against great difficulties in consequence. It was not until October that a respectable force could be gathered upon the aqueduct, and the work done in this month will probably equal that of any four months since the work was commenced.

During the month of November great progress will be made, should the weather continue favorable.

#### SUMMARY.

The right of way has been acquired from the Great Falls to the District line, and for about half the distance from the District line to the distributing reservoir. All the culverts in Maryland are either completed or nearly so; one has been built in the District. Two of the bridges have been nearly completed, and the preparatory works for the other two are finished. All the embankments and excavations over ravines in Maryland have been carried up to within a foot or two of grade, and all will be completed before the close of this season. Six thousand one hundred and four feet of masonry conduit have been completed. Two thousand and thirty-four feet and seven inches of tunnels have been excavated.

A large number of boarding houses, stables, shops, storehouses for cement, &c., have been built. Boats and scows for transportation of materials have been provided; a large stock of cement is being delivered, and quarries have been opened, from which, during the winter, stone will be taken out for the next season's operations; and the whole work is now prepared for a rapid and vigorous prosecution, such as will insure the delivery of water in this city next season, provided means are granted to carry the work on without another of the suspensions which have heretofore cost so much in time and money.

#### CASH ACCOUNT.

Appropriation of 1853.....	\$100,000 00
Appropriation of 1855.....	250,000 00
Appropriation of 1856, for existing liabilities and to preserve the work already done from injury.....	250,000 00
Appropriation of 1857.....	1,000,000 00

Total appropriations.....	1,600,000 00
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Expended to September 30, 1853.....	\$14,986 70
Expended in the year ending September 30, 1854.....	83,620 41
Expended in the year ending September 30, 1855.....	103,602 36

Expended in the year ending September 30, 1856.....	\$153,156 08
Expended in the year ending September 30, 1857.....	220,209 19
Total expended to 30th September, 1857.....	\$575,574 74
Amount remaining on hand 30th September, 1857.....	1,024,425 26
Of which there are belonging to the appropriation for liabilities and preservation of the work already done from injury, and therefore not applicable to the prosecution of the work.....	219,317 28
Amount available for the prosecution of the work on the 30th September, 1857.....	805,107 98
Probable amount to be expended by 30th June, 1858...	805,107 98
Amount required for proper prosecution of the work during the fiscal year ending 30th June, 1859.....	1,000,000 00

Respectfully submitted.

M. C. MEIGS,

*Captain of Engineers, in charge of Washington Aqueduct.*

Brevet Brigadier Gen. J. G. TOTTEN,

*Chief Engineers.*

All of which is respectfully submitted.

J. G. TOTTEN,

*Brevet Brigadier Gen. and Colonel of Engineers.*

# WASHINGTON AQUEDUCT.

## *Contract for Graduation.*

Agreement between Myers, Boston, Massachusetts, Jones and Pratt, of the State of Maine, of the first part, and Captain M. C. Meigs, of the corps of United States engineers, of the second part, acting under the authority of and for and in behalf of the United States of America, as engineer in charge of the Washington aqueduct, *witnesseth*:

1. That the party of the first part, for and in consideration of the matters hereinafter referred to and set out, covenants and agrees with the party of the second part to clear, grub, muck, excavate, embank, ram, and puddle, and do all other work required for the graduation of sections Nos. 14 and 15, between stations No. 154 and No. 250, upon the profile of the Washington aqueduct, in the engineer's office, as may be necessary to raise the embankment to the grade of the

aqueduct, and to excavate so much of the trench as may be deemed necessary by the engineer to supply, in whole or in part, the materials of said embankment, and to do the same in conformity to the specifications hereto annexed, which are to be taken as a part of this contract, and according to the directions from time to time to be given by the engineer.

2. The principal assistant engineer, or an assistant engineer, by his direction, shall, as soon as practicable after the end of each month, make out an estimate of the quantity and value of each species of work done pursuant to this contract, at the prices contained in the annexed proposal. He shall also include the value of any extra work done in consequence of any alteration of the plan of the work which may have been adopted by the said engineer in charge, when such alteration shall have caused an increased expense to the contractor; and when any such alteration shall have caused a saving of expense to the contractor, the engineer shall make a reasonable deduction therefor from the estimate so made; and if the said engineer in charge of the aqueduct shall approve said estimate, it is mutually agreed between the contracting parties that it shall be binding, and shall be paid by said engineer.

3. Within ten days after the return of any monthly estimate to the engineer in charge, nine-tenths of the sum appearing to be due, for work performed since the preceding estimate, shall be paid to the contractor.

4. Within thirty days after the work shall have been completed, and accepted by the engineer, a final estimate therefor shall be made and approved in the manner provided for making and approving monthly estimates, and shall in like manner be paid by said engineer in charge, together with the retained per centage.

5. The work shall always be open to examination during its progress by the engineers or other persons they may depute for that purpose, and the contractor shall, at all times, at his own expense, keep open a pathway alongside of the work, so that the above mentioned persons may readily pass by the same to the work above or below it.

6. At the expiration of every two weeks' work a report shall be made by the contractor to the assistant engineer having charge of this work, of the average force of men, carts, &c., employed upon it for the preceding two weeks, according to such forms as shall be supplied by the engineer.

7. It is mutually agreed between the parties to this contract that the work aforesaid shall be commenced within ten days after the notification of the approval of this contract, if the United States shall so soon acquire the right to the land necessary for the work, or as soon thereafter as the said right shall have been acquired; that it shall be steadily prosecuted without intermission with such force as shall, in the opinion of the engineer, secure its final completion within six months after the contractor is put in possession of the site, unless prevented or delayed by written orders from the engineer in charge, at the end of which time it shall be fully completed and delivered up; and it is further agreed, that, in the event that the said work shall not

be commenced, prosecuted, and completed, or if the contractor on being required thereto by the written order of the engineer in charge, the principal assistant engineer, or his assistant engineer, shall fail or refuse to increase the force employed on the work to such extent as in the opinion of the engineer shall be necessary to insure its completion in the stipulated time, or in case the contractor shall disobey any of the written orders of either of said engineers, or shall violate any of the conditions of this agreement, then, on a certificate of the fact by the principal assistant engineer, made to the engineer in charge, the said engineer in charge may declare this contract forfeited, and thereupon the same shall then become null and void, and the United States shall thereupon be exonerated from every obligation thence arising; and the reserved per centage on the contract price, as well as all materials furnished and work performed, and upon which no estimate or payment may have been made, shall be forfeited to and become the right and property of the United States, and the said engineer in charge may thereafter agree with any other person for the execution of the unfinished work, or may complete the same by day's work; and the said party of the first part shall have no appeal from the opinion and decision aforesaid, and he hereby releases all right to except to or question the same in any place, or under any circumstances whatever; but the party of the first part shall still remain liable to the party of the second part for the damages occasioned to him by the said failure, refusal or disobedience; and it is further agreed between the parties, that, in order to secure the punctual performance of the covenants above made by the party of the first part, and to indemnify and protect the party of the second part from loss, in case of default and forfeiture of this contract, the said party of the second part shall be authorized to retain in his hands until the completion of the contract *ten per cent.* on the amount of moneys at any time due to the said party of the first part.

8. The contractor for this work shall not knowingly employ any man, either as overseer, laborer, or in any situation, who shall have been dismissed, by the order of the engineer, from any other part of the work for bad workmanship, intemperance, or disorderly conduct. Nor shall he continue to employ any man who shall be declared by the engineer to be either disorderly, habitually intemperate, or a bad workman.

9. The contractor shall give his personal attention to the execution of the work hereby contracted for.

10. All buildings or fences adjacent to the work shall be preserved, in such manner as the engineer may direct, by the contractor, who shall protect them from injury by his hands, and, as far as practicable, by any other persons.

11. The engineer shall have the power to prescribe the manner of preparing for, beginning, and conducting every species of work to be done under this agreement with reference to its purpose and the durability of the work, and his instructions shall be promptly obeyed; and if he shall disapprove of the quality of any work it shall be the duty of the contractor to take down, at his own expense, and rebuild so

much thereof as shall be disapproved of; and if the contractor shall neglect or refuse to take down and rebuild work so disapproved of, the engineer shall cause the same to be done at his cost.

12. It is understood and agreed that all orders given by an engineer which shall cause an increase or diminution in the quantity or value of the work to be performed, shall be given in writing; and that when any claim shall be made by the contractor for extra compensation for work performed under such orders the orders shall be produced; and that all claims for extra work shall be made on or before the close of the month in which it is claimed to have been done, or it shall not be paid for at all.

13. It is further agreed that in case of the death, resignation, removal, or absence of any engineer, the United States, by its proper officers, may depute any other engineer to act in his place.

14. The United States reserves the right to suspend the work under this contract at any time; and when the work has been faithfully performed by the contractor he will be paid in full for all work done up to the time of such suspension.

15. Payments will be made to the contractor in drafts upon the treasury of the United States for coin. No estimate after the first shall be paid, unless the engineer is satisfied that the hands employed upon the work have been paid for the work of the month preceding, as provided in the advertisement under which this contract is made, a copy of which is hereto annexed.

16. And it is further stipulated and agreed that no member of Congress shall be admitted to any share or part in this contract or agreement, or to any benefits to arise therefrom; and this contract shall be in all its parts subject to the terms and conditions of an act of Congress passed on the twenty-first day of April, in the year of our Lord one thousand eight hundred and eight, entitled "An act concerning public contracts."

And this contract is also expressly understood to be subject to the terms and conditions of the joint resolution of Congress approved April 14, 1852, containing a proviso in the following terms, to wit: "*Provided*, Nothing herein contained shall be so construed as to authorize any officer of the United States to bind the United States by contract beyond the amount appropriated by Congress, or to sanction any such contract heretofore made." *Provided, also*, That it is expressly understood and agreed that this contract, nor any part thereof, shall not be sub-let nor assigned, but that it shall be well and truly carried out and fulfilled in good faith by the above recited party of the first part, and that all payments on account thereof shall be made to the aforesaid party of the first part, his heirs, executors, or administrators.

17. And for the true and faithful performance of all and singular the covenants, articles, and agreements hereinbefore particularly set forth, the subscribers hereunto bind themselves, jointly and severally, their and each of their successors, heirs, executors, and administrators.

18. Thus covenanted and agreed by the said parties this 26th day



of May, in the year of our Lord one thousand eight hundred and fifty-seven, (1857,) as witness their hands and seals.

(Done in quadruplicate.)

J. G. MYERS.

[SEAL.]

L. J. JONES.

[SEAL.]

J. WILLIS PRATT.

[SEAL.]

M. C. MEIGS.

[SEAL.]

*Capt. of Engrs., in charge Washington Aqueduct.*

Witnesses :

FREDERICK FIX,

Witness to J. G. Myers' signature.

J. P. JONES.

Z. W. DENHAM,

Witness to signature of Captain Meigs.

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*Specification for graduation on sections Nos. 14 and 15 of the Washington Aqueduct.*

#### PLAN AND DIMENSIONS OF THE AQUEDUCT.

1. The conduit will be circular, nine feet in interior diameter, to be built, generally, of three separate four-inch rings of brick—the engineer reserving the right to omit one of the brick rings at such points as he may think proper.

2. The centre of the conduit will be the level of the *grade* at any point.

3. All excavations in earth for the bed of the conduit will be fourteen feet wide at grade, unless otherwise directed, with slopes generally in earth cutting one foot base to two feet rise, and in rock of one foot base to four feet rise, but may be changed to such other slopes as in the opinion of the engineer may be found necessary or advisable.

4. The embankments for the bed of the conduit will be generally 44 feet wide at grade, and will have outer slopes of two feet base to one foot rise. The top of the bank over the conduit will be 12 feet wide, and will be 8 feet above grade; but these dimensions may be increased or diminished as the engineer may direct.

5. The excavations for the conduit trench will be cut down and the embankments for the conduit bed will be raised up to grade before the excavation is made through them for the lower semi-circle, except where rock is found or supposed to be, when the contractor may be required to excavate the whole trench before any embankment shall be made.

6. *Clearing and grubbing.*—Before commencing any excavation or embankment, the ground will be cleared of all timber, wood, or brushwood for at least 30 feet on each side of the centre line; and the whole base of the excavation and embankment, and as much on each side as may be required by the engineer, will be well and thoroughly grubbed, and all wood, brush, and roots removed therefrom; and, where it may



be found necessary to obtain embankment from points outside of the trench, the surface will also first be grubbed.

7. The contractor for the section work will be required to preserve such timber and posts as, in the opinion of the engineer, may be required upon other parts of the aqueduct, and the residue, or so much as he may require, may be used by the contractor.

8. *Mucking and benching*.—The surface of the ground through which excavations are to be made and upon which embankments will be built, after being grubbed as above described, will be excavated to such depth as, in the opinion of the engineer, may be sufficient to remove all leaves, grass, soil, and mould; and this *mucking* so removed will be placed at such convenient point outside of the embankment stakes as may be directed by the engineer, that it may be used as an outer covering to the banks when finished; and where embankment shall be obtained outside of the excavation for the trench, the mucking will, in like manner, be first removed, and disposed of as may be directed.

9. Where benching may be found necessary, the contractor will be required to make it at such time and in such manner as the engineer may direct.

10. *Excavations*.—This is meant to include the mucking and benching, the trench for the conduit, the pits for culverts, and, where required, drains to and from them; the foundations and pits for piers and abutments of bridges and overfalls, and the construction of drains along the aqueduct.

11. The contractor will in all cases be required to excavate to such dimensions and upon such portions of the work as the engineer may direct, that the masonry and brick work may be commenced and carried on, if necessary, at the same time with the graduation, and he will dispose of the whole or any part of the excavation as the engineer shall prescribe.

12. In side hill rock work the excavation will be done in such manner as not to shatter or disturb the rock on the outer edge of the cut, but it shall be left a firm support to the conduit. And if at any point the contractor should be allowed by the engineer to cut in horizontally at or above *grade*, the additional walling or embankment, rendered necessary in consequence, will be made at the cost of the contractor. The excavation below grade, in rock work, will be as nearly semi-circular as it can be made in blasting; and in earth it shall be carefully excavated to dimensions to be prescribed by the engineer, that it may be afterwards trimmed to the size and shape required for the brick work. Where it may be deemed expedient to cut back drains, or to widen the excavation along the trench to obtain earth for embankment, the earth so obtained may, at the option of the engineer, be measured and estimated as excavation or embankment, with the proper haul, but will not be estimated as both.

13. Detached stone, less than three cubic feet in size, will be included in the third class of excavation, (item No. 4 of the following proposal;) all others not exceeding twenty cubic feet will be included with soft rock, (item No. 3.)

It is understood that soft or rotten rock is such as cannot be exca-

vated by the shovel, spade, plough, or pick, alone, but requires the use of the crowbar and pick to break it up, yet is not hard enough to require drilling and blasting.

Hard rock is such as requires drilling and blasting in order to be broken up.

Materials not included in the above two items will be estimated as earth or mucking.

Of this classification the engineers will be the judges; the decision of the engineer in charge will be final in case of difference between the local engineer and the contractor.

14. Where excavation is deposited in spoil bank, it shall be in good shape for moving into the back filling over the conduit.

15. Stone and rock excavated from the section work, and not required in its construction, shall be deposited as may be directed by the engineers, and the cost of transportation over five hundred feet shall be estimated by the engineers.

16. The price for excavation will cover the transportation five hundred feet; and this means that the whole excavation or any part of it, upon one station or chain of one hundred feet, if required, will be hauled into embankment, rock filling, or spoil bank, upon any part of the five nearest adjacent chains, on either side. The additional haul that may be required, over five hundred feet, will be proposed for at a stated price per cubic yard. The length of this additional haul will be measured from the centre of the chain between any two stations whence the material is taken, to the centre of the chain which is 500 feet from the place of deposit.

17. *Embankment.*—This term includes the formation of the bank in which the conduit is to rest where the ground is below grade, the covering of culverts and filling against bridges and over falls when required by the engineer, the back filling over the conduit in cuts, as well as the covering in embankments, and the formation of roadways over and the levelling of low grounds (side filling) adjacent to the aqueduct, when required.

18. All embankments required for raising the bed of the conduit up to the level of grade will be carted in and spread in layers not exceeding three inches in depth, and, when required by the engineer, will be well rammed throughout each course, or such part thereof as may be required before another course is laid on. The embankment required for covering the conduit, both in cuts and fills, will also be carefully made, where practicable, in layers as above described, and so much thereof as may be required by the engineer will be rammed. If, in lieu of ramming, it shall be deemed necessary or advisable to puddle the whole or any portion of the bank, the earth to be so puddled shall be spread in layers generally not exceeding six inches in depth, and each course shall be made wet, and shall be well cut with the spade or shovel into the ground or the course below, and shall be worked into a stiff and cohesive mass before another course shall be commenced. All materials required for forming embankments shall be taken from such places as the engineer shall direct.

19. No logs, trees, brush, stumps, roots, leaves, grass, or stones, will be left in or admitted into any part of the embankment, and no

frozen earth or clods will be admitted into any embankments below grade, or be allowed to lie near the conduit above grade.

20. The banks, when finished, shall be made smooth on the top and on the slopes. When the section work is otherwise completed, the soil and muck removed in preparing for the excavation and embankment, if so ordered by the engineer, will be thrown up so as to form the outer cover of the embankment, and will be trimmed to the proper slopes.

21. *Puddling*.—The puddling, when any is required by the engineer, will be regulated by him, as to quality, thickness, and disposition. It will be measured and paid for as embankment, to which the price affixed in the following proposals will be additional, it being understood to cover only the expense of cutting and working the clay to a tough and firm consistency.

22. *Ramming*.—When embankment is required to be rammed, it will be spread in courses over the whole or such portions of the work as the engineer shall direct, and shall be packed evenly and uniformly to prevent unequal settlement. Like puddling, it will be measured and estimated as embankment, to which the price affixed in the following proposals will be additional, it being understood to cover the expense of pounding or packing the embankment into a compact mass.

23. *Dry walling*.—Where dry walling of any kind is required, the contractor may be required to build it upon such plan, of such materials, in such manner, and at such time, as the engineer shall direct, and the value thereof shall be adjudged by the engineer; but the right is reserved to the engineer to contract with other parties, or to employ persons by the day, to construct the whole or any part of the walling upon any section.

24. *General remarks*.—All "haul" of materials, whether counted as excavation or embankment, will be estimated as though they were taken from, hauled, and deposited upon the centre line of the aqueduct, unless they shall be taken, by direction of the engineer, from some point over one hundred feet from the said line, in which case they will be estimated by the most direct line from the borrow pit to the centre of the chain upon which they shall be required.

25. *Public and private roads*.—No public or private way shall be disturbed or obstructed, except under the special direction of the engineer; and whatever extra work is done to prevent such obstruction shall be according to the directions, and shall be paid for at the estimate of the engineer.

26. No ardent spirits shall be used or allowed on any part of the work, and no disorderly person or persons, objected to by the engineer, shall be retained in the employment of the contractor. Permitting men to board where ardent spirits are used or sold, though the premises should not be under the control of the contractor, will be considered a violation of this rule; any violation of it will be considered sufficient ground for the engineer to declare the contract void.

27. *Extra work*.—No allowance for extra work, beyond that specified, will be made, except such as shall have been done by the special written order of the engineers. All claims for extra work must be presented to the engineer at the end of the month in which such extra

work shall have been done, to be settled in the estimate of work done within that month, or they will not be considered.

All work done under these specifications will be, in all respects, in strict conformity with the directions of the engineers; and any work which they may require, and which may not be specified, will be valued by the engineer in charge; and his decision shall be final and without appeal.

28. *Monthly estimates.*—Monthly estimates will be made between the first and tenth of each month approximate of the whole amount of work done within the month, and as soon thereafter as practicable a payment will be made of nine-tenths of such estimates. But should the contractor abandon the work, or the engineer declare the contract void, all the work not paid for, as well as the retained per centage, will be forfeited to the United States.

29. No contract will be sub-let in whole or in part, but the contractors will be required to give their personal and constant attention to the work during its progress.

30. The subscriber offers to contract for graduation between stations No. — and No. —, upon section No. —, of the Washington aqueduct, at the prices mentioned in the following table, and to complete the work according to the preceding specification, and upon the terms and conditions stipulated in the contract which he may hereafter subscribe, in the form of which a copy has been exhibited to and read by him.

GRUBBING.		EXCAVATION.			EMBANKMENT.			
1.	2.	3.	4.	5.	6.	7.	8.	9.
Per acre.	Per cubic yard.	Per cubic yard.	Per cubic yard.	Haul per cubic yd. per 100 feet.	Per cubic yard.	Haul per cubic yd. per 100 feet.	Per cubic yard.	Per cubic yard.
Grubbing and clearing the trees, bushes, stumps, and roots from the space required for the excavation and embankments.	Of solid rock requiring blasting.	Of soft rock and detached rock containing more than three and less than twenty cubic feet.	Of gravel, earth, and loose stone, or any material other than that described in Nos. 2 and 3.	Of materials obtained from the excavation and transported over 500 feet, in addition to the price for excavation.	Of materials not obtained from the excavation and hauled not over 500 feet.	Of materials not obtained from the excavation and hauled over 500 feet, in addition to No. 6.	Pudding of materials—paid as excavation or embankment, in addition to the price for excavation or embankment.	Ramming of materials—paid as excavation or embankment, in addition to the price for excavation or embankment.
\$60 00	\$9 00	\$0 50	\$0 17	\$0 01	\$0 01	\$0 01	\$0 26	\$0 22

Signed by us this 7th day of May, 1857.

MYERS, JONES, PRATT.

To Captain M. C. MORGAN, *United States Engineers*:

We, the undersigned, residents of ———, in the State of ———, hereby jointly and severally covenant with the United States, and guaranty, in case the foregoing bid of ——— be accepted, that he or they will, within ten days after the acceptance of said bid, execute a contract for the same, with good and sufficient sureties, to perform the work in conformity to the terms of the advertisement and specifications under which it was made. And in case the said ——— shall fail to enter into contract as aforesaid, we guaranty to make good the difference between the offer by the said ——— and the next lowest bidders.

I hereby certify that, to the best of my knowledge and belief, the above named guarantors are good and sufficient.

## WASHINGTON AQUEDUCT.

*Contract for Conduit on Sections No. 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13.*

Agreement between Henry Cady, of Staunton, Augusta county, of the State of Virginia, of the first part, and Captain M. C. Meigs, of the corps of United States engineers, of the second part, acting under the authority of, and for and in behalf of the United States of America, as engineer in charge of the Washington aqueduct, *witnesseth*:

1. That the party of the first part, for and in consideration of the matters hereinafter referred to and set out, covenants and agrees with the party of the second part, to do all the necessary trimming to prepare the trench for the conduit, to furnish all the stone that may be needed for rubble masonry or concrete, to transport from the canal or depots to the work all the brick, cement, and sand necessary to build the conduit, to construct and build in a substantial and workmanlike manner the said conduit in sections No. 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12, between stations No. 80 and No. 112, and to make all the excavation, embankment, and back filling necessary to complete the said section, and to do the same in conformity to the specifications hereto annexed, which are to be taken as a part of this contract, and according to the directions from time to time to be given by the engineer.

2. The principal assistant engineer, or an assistant engineer, by his directions, shall, as soon as practicable, after the end of each month, make out an estimate of the quantity and value of each species of work done pursuant to this contract, at the prices contained in the annexed proposal. He shall also include the value of any extra work done in consequence of any alteration of the plan of the work which may have been adopted by the said engineer in charge, or of the materials required for its construction, when such alterations shall have caused an increased expense to the contractor; and when such alteration shall have caused a saving of expense to the contractor, the engineer shall make a reasonable deduction therefor from the estimate so made; and if the said engineer in charge of the aqueduct shall approve said estimate, it is mutually agreed between the contracting parties that it shall be binding, and shall be paid by said engineer.

3. Within ten days after the return of any monthly estimate to the engineer in charge, nine-tenths of the sum appearing to be due, for work performed since the preceding estimate, shall be paid to the contractor.

4. Within thirty days after the work shall have been completed, and accepted by the engineer, a final estimate therefor shall be made and approved in the manner provided for making and approving monthly estimates, and shall in like manner be paid by said engineer in charge, together with the retained per centage.

5. The work shall be open to inspection during its progress by the engineers or other persons they may depute for that purpose, and the contractor shall, at all times, at his own expense, keep open a pathway alongside of the work, so that the above mentioned persons may readily pass by the same to the work above or below it.



6. At the expiration of every two weeks' work, a report shall be made by the contractor to the assistant engineer having charge of this work of the average force of men, carts, &c., employed upon it for the preceding two weeks, according to such forms as shall be supplied by the engineer.

7. It is mutually agreed between the parties to this contract, that the work on the aforesaid conduit shall be commenced within twenty days after the notification of the approval of this contract, if the United States shall so soon acquire the right to the land necessary for the work, or as soon thereafter as the said right shall have been acquired, that it shall be steadily prosecuted without intermission, with such force as shall, in the opinion of the engineer, secure its final completion by the first day of December, in the year 1858, at which time it shall be fully completed and delivered up; and it is further agreed, that in the event that the said work shall not be commenced, prosecuted, and completed, or if the contractor, on being required thereto by the written order of the engineer in charge, the principal assistant engineer, or the assistant engineer, shall fail or refuse to increase the force employed on the work to such extent as, in the opinion of the engineer, shall be necessary to insure its completion by the stipulated time, or in case the contractor shall disobey any of the written orders of either of said engineers, or shall violate any of the conditions of this agreement, then, on a certificate of the fact by the principal assistant engineer made to the engineer in charge, the said engineer in charge may declare this contract forfeited, and thereupon the same shall then become null and void, and the United States shall thereupon be exonerated from every obligation thence arising; and the reserved per centage on the contract price, as well as all materials furnished and work performed, and upon which no estimate or payment may have been made, shall be forfeited to, and become the right and property of, the United States, and the said engineer in charge may thereafter agree with any other person for the execution of the unfinished work, or may complete the same by day's work; and the said party of the first part shall have no appeal from the opinion and decision aforesaid, and he hereby releases all right to except to or question the same, in any place, or under any circumstances whatever; but the party of the first part shall still remain liable to the party of the second part for the damages occasioned to him by the said failure, refusal or disobedience; and it is further agreed between the parties, that in order to secure the punctual performance of the covenants above made by the party of the first part, and to indemnify and protect the party of the second part from loss, in case of default and forfeiture of this contract, the said party of the second part shall be authorized to retain in his hands, until the completion of the contract, *ten per cent.* on the amount of moneys at any time due to the said party of the first part.

8. The contractor for this work shall not knowingly employ any man, either as overseer, laborer, or in any situation, who shall have been dismissed by the order of the engineer from any other part of the work for bad workmanship, intemperance, or disorderly conduct. Nor shall he continue to employ any man who shall be declared by the engineer to be either disorderly, habitually intemperate, or a bad workman.



9. The contractor shall give his personal attention to the execution of the work hereby contracted for.

10. All buildings or fences on the line of the aqueduct shall be preserved, in such manner as the engineer may direct, by the contractor, who shall protect them from injury by his hands, and, as far as practicable, by any other persons.

11. The engineer shall have the power to prescribe the manner of preparing for, beginning, and conducting, every species of work to be done under this agreement, with reference to its purpose and the durability of such work; and his instructions shall be promptly obeyed; and, if he shall disapprove of the quality of any work, it shall be the duty of the contractor to take down, at his own expense, and rebuild so much thereof as shall be disapproved of; and if the contractor shall neglect or refuse to take down and rebuild work so disapproved of, the engineer shall cause the same to be taken down and rebuilt at the contractor's cost.

12. It is understood and agreed that all orders given by an engineer, which shall cause an increase or diminution in the quantity or value of the work to be performed, shall be given in writing, and that when any claim shall be made by the contractor for extra compensation for work performed under such orders, the orders shall be produced; and that all claims for extra work shall be made on or before the close of the month in which it is claimed to have been done, or it shall not be paid for at all.

13. It is further agreed that in case of the death, resignation, removal, or absence of any engineer, the United States, by its proper officers, may depute any other engineer to act in his place.

14. The United States reserves the right to suspend the work under this contract at any time; and when the work has been faithfully performed by the contractor, he will be paid in full for all work done up to the time of such suspension.

15. Payments will be made to the contractor in drafts upon the treasury of the United States for coin. No estimate after the first shall be paid, unless the engineer is satisfied that the hands employed upon the work have been paid for the work of the month preceding, as provided in the advertisement under which this contract is made, a copy of which is hereto annexed.

16. And it is further stipulated and agreed that no member of Congress shall be admitted to any share or part in this contract or agreement, or to any benefits to arise therefrom; and this contract shall be in all its parts subject to the terms and conditions of an act of Congress, passed on the twenty-first day of April, in the year of our Lord one thousand eight hundred and eight, entitled "An act concerning public contracts."

And this contract is also expressly understood to be subject to the terms and conditions of the joint resolution of Congress approved April 14, 1852, containing a proviso in the following terms, to wit: "*Provided*, Nothing herein contained shall be so construed as to authorize any officer of the United States to bind the United States by contract beyond the amount appropriated by Congress, or to sanction any such contract heretofore made:" *Provided, also*, That it is

expressly understood and agreed that this contract, nor any part thereof, shall not be sublet nor assigned; but that it shall be well and truly carried out and fulfilled in good faith by the above recited party of the first part, and that all payments on account thereof shall be made to the aforesaid party of the first part, his heirs, executors, or administrators.

17. And for the true and faithful performance of all and singular the covenants, articles, and agreements hereinbefore particularly set forth, the subscribers hereunto bind themselves, jointly and severally, their and each of their successors, heirs, executors, and administrators.

18. Thus covenanted and agreed by the said parties this 26th day of May, in the year of our Lord one thousand eight hundred and fifty-seven, (1857,) as witness their hands and seals.

HENRY CADY. [SEAL.]

(Done in quadruplicate.)

M. C. MEIGS, [SEAL.]

*Capt. of Engineers, in charge of Washington Aqueduct.*

Witness as to Cady:

WILLIAM H. HARMAN.

Witness to signature of Captain Meigs:

Z. W. DENHAM.

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#### WASHINGTON AQUEDUCT.

#### *Specifications for Conduit.*

1. The conduit will be circular, and generally of nine feet interior diameter; it will, when of brick, generally be built of three separate four and a half inch rings of hard brick. Where it passes through ground rising as high as the intrados of the arch, the inner ring will sometimes be omitted, and the brick work reduced to nine inches.

2. In rock cuts, and other deep cuts, where suitable stone is at hand, concrete or rubble stone masonry will be substituted for brick, in whole or in part, particularly in the lower or reversed arch.

3. When the stone available is of such quality that it may be fit to use in the exterior rings or back of the arches, but not hard enough to make the inner face in contact with the water, this inner face will be lined with a four and a half inch ring of brick.

4. Proposals will be received for each kind of work, and, where stone is used, for furnishing it, both in shape and size, for masonry and for concrete.

5. The centre of the conduit at any point is the *grade* of the aqueduct at that place. The excavations and embankments will be made to the level of grade at each place of operations before the contractor for the conduit will be allowed to commence his work there. The excavation for the lower semi-circle or reversed arch, however, will generally be made by the contractor for the conduit, and it will be trimmed out but little in advance of the laying of the masonry. After

a length of one hundred feet of masonry is finished, the excavation for the next one hundred feet, if of suitable material, will be placed upon the work just laid as back filling, and will be well rammed to sustain the haunches of the arch.

6. This excavation, when in earth, will be carefully made to the prescribed form of the extrados of the reversed arch; it will be evenly trimmed to receive the masonry or concrete, without waste of mortar. The quantity is one hundred and eighty-two and eight-tenths cubic yards to a chain of one hundred feet.

7. Where embankments are made in ravines, the excavation of adjacent cuts will be made by the contractors for graduation, who may be required in such places to excavate, in part, the lower semi-circle. The excavation thus made will be about four feet deep, eight feet wide on top, and six feet wide on bottom, and will leave for the contractor for the conduit about eighty cubic yards to the chain, or eight-tenths of a cubic yard to each foot lineal, to be removed as trimming; such trimming will be paid for by the lineal foot. The material taken out will be used in embankment and will be paid for as such, unless it be rock, when it will be paid for as excavation. The price for trimming is intended to cover the expense of preparing the trench for the conduit.

8. In places where the excavation above grade shall be left untouched or unfinished by the contractor for graduation, the contractor for conduit may be required to take it for the back filling for any finished conduit, and will be paid for it only as embankment; and any solid rock, requiring blasting or quarrying, in such cuts will be paid for as rock excavation. If needed for masonry or concrete, the contractor may use it, if suitable, without charge therefor, and he will be paid for his masonry or concrete as though he had furnished the stone from without the work.

9. In rock cuttings, care will be taken to cut the lower semi-circle as nearly as possible to the required form, and any irregularity made in blasting and quarrying will be filled with the masonry or concrete, which, in such places, may be required to take the place, in whole or in part, of the brick work below grade.

10. *Brick masonry in conduit.*—The bricks, at the time of laying, will be thoroughly wet; every brick must be laid and pressed down into a full bed of mortar, which shall cover its bed and joints; and this bedding shall be done at one operation for each brick, so that no mortar need be worked in after the brick is placed. The inner edge of the joint of each course will be the least possible to admit of mortar between the bricks. The joint of mortar between each two rings will not be less than three-eighths of an inch in thickness.

11. The masonry or concrete will not be commenced at any point until the trench, trimmed and prepared, has been inspected and approved by the engineers.

12. *Stone masonry of conduit.*—This will be made of small rubble stone, none of which will exceed fourteen inches in width or depth. Each stone will be laid in a full bed of mortar, and hammered till the mortar is pressed out at the front and the joints are completely filled. The work, when laid together, shall be water-tight, and if, upon

trial, it should prove not to be so, it will be taken up and relaid by the contractor at his own expense. Its inner surface will be well plastered with a coat of cement mortar, and be floated smooth and even.

13. *Concrete.*—The stone for concrete must be hard and sound. It will be broken to pass through a two inch ring. It must be kept free from sticks and dirt, and when mixed and laid will be rammed into a compact and water-tight mass.

14. One barrel of cement, with two and a half barrels of sand and thirty cubic feet of stone, will make a batch of concrete.

15. The materials must be all measured: the sand and cement in barrels, and the broken stone in boxes containing ten cubic feet each; which boxes will be furnished by the United States.

16. The mortar having been spread upon a bed of plank, the broken stone will be spread evenly over it, and the whole mass turned over twice, and thoroughly mixed with a hoe or shovel.

17. It will then be deposited in its place, and carefully packed to form either by ramming or by floating the upper or exposed surface with a straight edge.

18. The concrete and masonry of the reversed arch will average the required thickness in each place, and be estimated and paid for as of that thickness, and no allowance will be made to the contractor for filling up any excess of size in the excavation of the trench.

19. Full directions, with drawings of the mode of construction, whether of brick alone, or of brick, stone or concrete in whole or in part, in each portion of the work, will be given by the engineer from time to time, and he will be the judge as to which mode of construction is to be adopted in each portion of the work.

20. Before the centres are struck, the ground between the arch and the bank in cuts and the top of embankments over low grounds will be well cleared of all rubbish, and such space as may be required will be filled with fine water-tight earth, and be well rammed or puddled to support the haunches of the arch.

21. *Embankment and back filling.*—After clearing off the space between the conduit and the sides of cuts and the top of the embankments, the banks above grade will be carried up. These will, so far as practicable, be carted in and spread in layers of three inches in depth.

22. When earth is required to be rammed, it will be done (in courses not exceeding three inches in depth) with a heavy maul of iron or wood, and will be packed evenly and uniformly to prevent uneven settlement. Where puddling is required, the earth will be spread in layers not exceeding six inches in depth, and each course will be well sprinkled with water and tramped, and then be cut through with a spade or shovel into the ground or course below, water being added as the cutting goes on, until it is worked into a stiff and cohesive mass before another course is commenced. The quantity, quality, and disposition of rammed and puddled earth will be regulated by the engineer. It will be measured, estimated, and paid for as embankment carried into bank, to which the price affixed

in the following proposal for ramming or puddling, as the case may be, will be additional.

23. No logs, trees, stumps, brushwood, roots, leaves, grass, or stones shall be left in or admitted into any part of the embankment; and no frozen earth or clods will be admitted, except by special permission of the engineer, and then only in the outer edge of the embankment.

24. The banks, when finished, will be made smooth on the top and slopes; and when complete the soil and muck which may be reserved for this purpose will be thrown upon the top and slopes, and be trimmed to conform to them.

25. All work done under the specifications will be in all respects in strict conformity with the directions of the engineers, and any work which they may require and which may not be specified will be valued by the engineer in charge; and his decision shall be final and without appeal.

26. No ardent spirits shall be used or allowed on any part of the work, and no disorderly person or persons, objected to by the engineer, shall be retained in the employment of the contractor. Permitting men to board where ardent spirits are used or sold, though the premises should not be under the control of the contractor, will be considered a violation of this rule; any violation of it will be considered sufficient ground for the engineer to declare the contract void.

27. *Mortar*.—The mortar for masonry will be made of two and a half parts by measure of clean, sharp, well screened sand, to one part of cement. It will be mixed on a bed of plank, to be approved by the engineer. The mortar bed will be protected by a canvas shelter from soaking rains or drying sun.

28. The sand and cement, after being measured, will be mixed dry, and small quantities only, taken from the heap, will be mixed with water as required.

29. The time from the first wetting of the cement to the using of the mortar shall not exceed half an hour.

30. Cement will be furnished by the United States at their cement houses on the bank of the canal, from which it will be transported by the conductor at his own cost. It will be drawn upon the written orders of the engineer, who will be the sole judge as to which depot it shall be drawn from, and shall express the same in said orders. The quantity shall not in any case exceed six hundred pounds to each thousand brick, nor three hundred pounds to each cubic yard of stone laid. Either in masonry or concrete any excess over this will be charged to the contractor, at the rate of fifty cents per hundred pounds. Any unnecessary waste of cement detected by the engineer will also be charged against the contractor at the same rate, whether the prescribed quantity be used in the work or not; and of the proper care exercised by the contractor the engineer will be the judge. The contractor will be required to provide sheds for keeping the cement at the work dry and secure from the weather, and he will also return the bags or barrels, if required, to the United States.

31. Sand will be furnished by the United States on the bank of the canal. It will be hauled by the contractor at his own cost, and de-

posited upon beds to be by him prepared for it, to be approved by the engineer. It must be transported, deposited, and used without waste, and any waste will be charged to the contractor.

32. He will be required to haul sand in advance of his work, if necessary to clear the binns and landings for the reception of additional sand.

33. Bricks will be furnished by the United States, delivered upon the banks of the canal, or at some other point equally convenient, and will be transported to the work by the contractor for masonry. The landings from which they are to be taken will be designated by the engineer.

34. It is expressly stipulated that, although the United States agrees to furnish the materials above named, and will make every effort to do the same, yet that if from any cause there should be delay or failure on the part of the said United States, there shall not be any claim for damages on the part of the said contractors against the United States.

35. The forms and the centres for laying the conduit will be furnished by the United States at the rate of three hundred feet of centres for each gang of not less than twelve bricklayers, but the contractor for the conduit will be required to transport them from the bank of the canal to his work, and from any one part of it where they may have been deposited or used to any other part where they may be needed; he will set them under the direction of the engineer, and he will be required to take proper care that they be not unnecessarily damaged. If damaged, they will be repaired by the United States at the expense of the contractor. He will also give due notice to the engineer of the time when he will need centres, cement, and sand, and of the quantity of each.

36. All work done under this specification will be, in all respects, in strict conformity with the directions of the engineer, and any work which he may require to be done, and which may not be particularly specified, will be valued by the engineer, and his decision will be final and without appeal.

37. The subscriber offers to contract to do all the work required to prepare for, lay, and embank over the conduit on sections Nos. 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13, at the prices stated in the following table, and to complete the work according to the preceding specifications, and upon the terms and conditions stipulated in the contract which he may hereafter subscribe, in the form a copy of which has been shown to and read by him.



TRAINING FOR CONDUIT.		EXCAVATION OF SOLID ROCK.		LAYING CONDUIT.			EMBANKMENT AND BACK FILLING.		
Below grade.	Below grade.	Above grade.	Brick.	Stone.	Concrete.	Embankment proper.	Ramming.	Puddling.	
Per lineal foot.	Per cubic yard.	Per cubic yard.	Per 1,000.	Per cubic yard.	Per cubic yard.	Per cubic yard.	Per cubic yard.	Per cubic yard.	
Trimming the trench below grade and preparing it for the conduit.	Excavation of solid rock found in the trench below grade.	Excavation of solid rock above grade in the cuts which may be left by the graduation contractor, and which the contractor for conduit will be required to complete.	Laying bricks in the conduit, including the transportation of cement, sand and brick from the canal or depots to the work.	Laying stone in conduit when required, including furnishing the stone and its transportation to the work, and the transportation of cement and sand from the canal or depots to the work, and plastering the inner face.	Concrete where required, including the furnishing, transportation and breaking of stone, and the mixing and putting in of the concrete to the required form, and transportation of cement and sand from the canal or depots to the work.	Embankment placed around and over the conduit, whether taken from the cuts or borrowed.	Ramming earth—in addition to the price paid for it as embankment.	Puddling earth—in addition to the price paid for it as embankment.	
\$0 60	\$1 25	\$1 00	\$5 00	\$3 50	\$3 00	\$0 20	\$0 12	\$0 20	

Signed by me, this 6th day of May, in the year of our Lord 1857.

HENRY GADY.

To Captain M. C. Meres, *United States Engineer*:

We, the undersigned, residents of \_\_\_\_\_, in the State of \_\_\_\_\_, hereby, jointly and severally, covenant with the United States, and guaranty, in case the foregoing bid of \_\_\_\_\_ be accepted, that he or they will, within ten days after the acceptance of the said bid, execute a contract for the same, with good and sufficient sureties, to perform the work in conformity to the terms of the advertisement and specifications under which it was made. And in case the said \_\_\_\_\_ shall fail to enter into contract as aforesaid, we guaranty to make good the difference between the offer by the said \_\_\_\_\_ and the next lowest bidders.

I hereby certify that, to the best of my knowledge and belief, the above named guarantors are good and sufficient.



## WASHINGTON AQUEDUCT.

*Contract for Conduit on Sections No. 14 and 15.*

Agreement between M. S. Carman, R. J. Dobbins, of Philadelphia, Pennsylvania, and F. Wehr, of Baltimore, Maryland, and Robert McCay, jr., of Philadelphia, of the State of Pennsylvania, of the first part, and Captain M. C. Meigs, of the corps of United States engineers, of the second part, acting under the authority of, and for and in behalf of the United States of America, as engineer in charge of the Washington aqueduct, *witnesseth*:

1. That the party of the first part, for and in consideration of the matters hereinafter referred to and set out, covenants and agrees with the party of the second part to do all the necessary trimming to prepare the trench for the conduit, to furnish all the stone that may be needed for rubble masonry or concrete, to transport from the canal or depots to the work all the brick, cement, and sand necessary to build the conduit, to construct and build in a substantial and workmanlike manner the said conduit in section No. 14 and 15, between stations No. 154 and No. 250, and to make all the excavation, embankment, and back filling, necessary to complete the said section, and to do the same in conformity to the specifications hereto annexed, which are to be taken as a part of this contract, and according to the directions from time to time to be given by the engineer.

2. The principal assistant engineer, or an assistant engineer, by his directions, shall, as soon as practicable, after the end of each month, make out an estimate of the quantity and value of each species of work done pursuant to this contract, at the prices contained in the annexed proposal. He shall also include the value of any extra work done in consequence of any alteration of the plan of the work which may have been adopted by the said engineer in charge, or of the materials required for its construction, when such alterations shall have caused an increased expense to the contractor; and when such alteration shall have caused a saving of expense to the contractor, the engineer shall make a reasonable deduction therefor from the estimate so made; and if the said engineer in charge of the aqueduct shall approve said estimate, it is mutually agreed between the contracting parties that it shall be binding, and be paid by said engineer.

3. Within ten days after the return of any monthly estimate to the engineer in charge, nine-tenths of the sum appearing to be due, for work performed since the preceding estimate, shall be paid to the contractor.

4. Within thirty days after the work shall have been completed, and accepted by the engineer, a final estimate therefor shall be made and approved in the manner provided for making and approving monthly estimates, and shall in like manner be paid by said engineer in charge, together with the retained per centage.

5. The work shall be open to inspection during its progress by the engineers or other persons they may depute for that purpose, and the contractor shall at all times, at his own expense, keep open a pathway alongside of the work, so that the above mentioned persons may readily pass by the same, to the work above or below it.

6. At the expiration of every two weeks' work a report shall be made by the contractor to the assistant engineer having charge of this work of the average force of men, carts, &c., employed upon it for the preceding two weeks, according to such forms as shall be supplied by the engineer.

7. It is mutually agreed between the parties to this contract, that the work on the aforesaid conduit shall be commenced within twenty days after the notification of the approval of this contract, if the United States shall so soon acquire the right to the land necessary for the work, or as soon thereafter as the said right shall have been acquired, that it shall be steadily prosecuted without intermission, with such force as shall, in the opinion of the engineer, secure its final completion by the first day of December, in the year 1858; at which time it shall be fully completed and delivered up; and it is further agreed, that in the event that the said work shall not be commenced, prosecuted, and completed, or if the contractor, on being required thereto by the written order of the engineer in charge, the principal assistant engineer, or the assistant engineer, shall fail or refuse to increase the force employed on the work to such extent as in the opinion of the engineer shall be necessary to insure its completion by the stipulated time; or in case the contractor shall disobey any of the written orders of either of said engineers, or shall violate any of the conditions of this agreement, then on a certificate of the fact, by the principal assistant engineer, made to the engineer in charge, the said engineer in charge may declare this contract forfeited, and thereupon the same shall then become null and void, and the United States shall thereupon be exonerated from every obligation thence arising; and the reserved per centage on the contract price, as well as all materials furnished and work performed, and upon which no estimate or payment may have been made, shall be forfeited to, and become the right and property of the United States, and the said engineer in charge may thereafter agree with any other person for the execution of the unfinished work, or may complete the same by day's work; and the said party of the first part shall have no appeal from the opinion and decision aforesaid, and he hereby releases all right to except to or question the same in any place or under any circumstances whatever; but the party of the first part shall still remain liable to the party of the second part for the damages occasioned to him by the said failure, refusal or disobedience; and it is further agreed between the parties that, in order to secure the punctual performance of the covenants above made by the party of the first part, and to indemnify and protect the party of the second part from loss, in case of default and forfeiture of this contract, the said party of the second part shall be authorized to retain in his hands, until the completion of the contract, *ten per cent.* on the amount of moneys at any time due to the said party of the first part.

8. The contractor for this work shall not knowingly employ any man, either as overseer, laborer, or in any situation, who shall have been dismissed, by the order of the engineer, from any other part of the work for bad workmanship, intemperance, or disorderly conduct; nor shall he continue to employ any man who shall be declared by the

engineer to be either disorderly, habitually intemperate or a bad workman.

9. The contractor shall give his personal attention to the execution of the work hereby contracted for.

10. All buildings or fences on the line of the aqueduct shall be preserved in such manner as the engineer may direct by the contractor, who shall protect them from injury by his hands, and, as far as practicable, by any other persons.

11. The engineer shall have the power to prescribe the manner of preparing for, beginning and conducting every species of work to be done under this agreement with reference to its purpose and the durability of such work, and his instructions shall be promptly obeyed; and if he shall disapprove of the quality of any work it shall be the duty of the contractor to take down at his own expense and rebuild so much thereof as shall be disapproved of, and if the contractor shall neglect or refuse to take down and rebuild work so disapproved of, the engineer shall cause the same to be taken down and rebuilt at the contractor's cost.

12. It is understood and agreed that all orders given by an engineer, which shall cause an increase or diminution in the quantity or value of the work to be performed, shall be given in writing, and that when any claim shall be made by the contractor for extra compensation for work performed under such orders, the orders shall be produced; and that all claims for extra work shall be made on or before the close of the month in which it is claimed to have been done, or it shall not be paid for at all.

13. It is further agreed that in case of the death, resignation, removal, or absence of any engineer, the United States, by its proper officers, may depute any other engineer to act in his place.

14. The United States reserves the right to suspend the work under this contract at any time; and when the work has been faithfully performed by the contractor he will be paid in full for all work done up to the time of such suspension.

15. Payments will be made to the contractor in drafts upon the treasury of the United States for coin. No estimate after the first shall be paid, unless the engineer is satisfied that the hands employed upon the work have been paid for the work of the month preceding, as provided in the advertisement under which this contract is made, a copy of which is hereto annexed.

16. And it is further stipulated and agreed that no member of Congress shall be admitted to any share or part in this contract or agreement, or to any benefits to arise therefrom; and this contract shall be in all its parts subject to the terms and conditions of an act of Congress, passed on the twenty-first day of April, in the year of our Lord one thousand eight hundred and eight, entitled an "An act concerning public contracts."

And this contract is also expressly understood to be subject to the terms and conditions of the joint resolution of Congress approved April 14, 1852, containing a proviso in the following terms, to wit: "Provided, Nothing herein contained shall be so construed as to authorize any officer of the United States to bind the United States

by contract beyond the amount appropriated by Congress, or to sanction any such contract before made;” *Provided, also*, that it is expressly understood and agreed, that this contract, nor any part thereof, shall not be sublet nor assigned; but that it shall be well and truly carried out and fulfilled in good faith by the above recited party of the first part, and that all payments on account thereof shall be made to the aforesaid party of the first part, his heirs, executors, or administrators.

17. And for the true and faithful performance of all and singular the covenants, articles and agreements hereinbefore particularly set forth, the subscribers hereunto bind themselves, jointly and severally, their and each of their successors, heirs, executors, and administrators.

18. Thus covenanted and agreed by the said parties this fifth day of June, in the year of our Lord one thousand eight hundred and fifty-seven, (1857,) as witness their hands and seals.

MICHAEL S. CARMAN.	[SEAL.]
RICHARD J. DOBBINS.	[SEAL.]
FREDERICK WEHR.	[SEAL.]
ROBERT McCAY, Jr.	[SEAL.]
M. C. MEIGS,	

*Captain of Engineers, in charge of the Washington Aqueduct.*

(Done in quadruplicate.)

Witnesses present at the signing of M. S. Carman, R. J. Dobbins, F. Wehr, and R. McCay, jr.:

J. BERNHARD,  
WM. J. LEIPER.

Witness to signature of Capt. Meigs:  
Z. W. DENHAM.

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WASHINGTON AQUEDUCT.

*Specification for Conduit.*

1. The conduit will be circular and generally of nine feet interior diameter; it will, when of brick, generally be built of three separate four and a half inch rings of hard brick. Where it passes through ground rising as high as the intrados of the arch, the inner ring will sometimes be omitted, and the brick work reduced to nine inches.

2. In rock cuts, and other deep cuts, where suitable stone is at hand, concrete or rubble stone masonry will be substituted for brick, in whole or in part, particularly in the lower or reversed arch.

3. When the stone available is of such quality that it may be fit to use in the exterior rings or back of the arches, but not hard enough to make the inner face in contact with the water, this inner face will be lined with a four and a half inch ring of brick.

4. Proposals will be received for each kind of work, and, where stone is used, for furnishing it, both in shape and size, for masonry and for concrete.

5. The centre of the conduit at any point is the *grade* of the aqueduct at that place. The excavations and embankments will be made to the level of grade at each place of operations before the contractor for the conduit will be allowed to commence his work there. The excavation for the lower semi-circle or reversed arch, however, will generally be made by the contractor for the conduit, and it will be trimmed out but little in advance of the laying of the masonry. After a length of one hundred feet of masonry is finished, the excavation for the next one hundred feet, if of suitable material, will be placed upon the work just laid as back filling, and will be well rammed to sustain the haunches of the arch.

6. This excavation, when in earth, will be carefully made to the prescribed form of the extrados of the reversed arch; it will be evenly trimmed to receive the masonry or concrete, without waste of mortar. The quantity is one hundred and eighty-two and eight-tenths cubic yards to a chain of one hundred feet.

7. Where embankments are made in ravines, the excavation of adjacent cuts will be made by the contractors for graduation, who may be required in such places to excavate, in part, the lower semi-circle. The excavation thus made will be about four feet deep, eight feet wide on top, and six feet wide on bottom, and will leave for the contractor for the conduit about eighty cubic yards to the chain, or eight-tenths of a cubic yard to each foot lineal, to be removed as trimming; such trimming will be paid for by the lineal foot. The material taken out will be used in embankment, and will be paid for as such, unless it be rock, when it will be paid for as excavation. The price for trimming is intended to cover the expense of preparing the trench for the conduit.

8. In places where the excavation above grade shall be left untouched or unfinished by the contractor for graduation, the contractor for conduit may be required to take it for the back filling for any finished conduit, and will be paid for it only as embankment; and any solid rock requiring blasting or quarrying in such cuts will be paid for as rock excavation. If needed for masonry or concrete, the contractor may use it, if suitable, without charge therefor, and he will be paid for his masonry or concrete as though he had furnished the stone from without the work.

9. In rock cuttings care will be taken to cut the lower semi-circle as nearly as possible to the required form, and any irregularity made in blasting and quarrying will be filled with the masonry or concrete, which, in such places, may be required to take the place, in whole or in part, of the brick work below grade.

10. *Brick masonry in conduit.*—The bricks, at the time of laying, will be thoroughly wet; every brick must be laid and pressed down into a full bed of mortar, which shall cover its bed and joints; and this bedding shall be done at one operation for each brick, so that no mortar need be worked in after the brick is placed. The inner edge of the joint of each course will be the least possible to admit of mortar between the bricks. The joint of mortar between each two rings will not be less than three-eighths of an inch in thickness.

11. The masonry or concrete will not be commenced at any point

until the trench, trimmed and prepared, has been inspected and approved by the engineers.

12. *Stone masonry of conduit.*—This will be made of small rubble stone, none of which will exceed fourteen inches in width or depth. Each stone will be laid in a full bed of mortar, and hammered till the mortar is pressed out at the front, and the joints are completely filled. The work, when laid together, shall be water tight, and if, upon trial, it should prove not to be so, it will be taken up and relaid by the contractor at his own expense. Its inner surface will be well plastered with a coat of cement mortar, and be floated smooth and even.

13. *Concrete.*—The stone for concrete must be hard and sound. It will be broken to pass through a two-inch ring. It must be kept free from sticks and dirt, and when mixed and laid will be rammed into a compact and water tight mass.

14. One barrel of cement, with two and a half barrels of sand and thirty cubic feet of stone, will make a batch of concrete.

15. The materials must be all measured; the sand and cement in barrels, and the broken stone in boxes containing ten cubic feet each, which boxes will be furnished by the United States.

16. The mortar having been spread upon a bed of plank, the broken stone will be spread evenly over it, and the whole mass turned over twice, and thoroughly mixed with a hoe or shovel.

17. It will then be deposited in its place, and carefully packed to form either by ramming or by floating the upper or exposed surface with a straight edge.

18. The concrete and masonry of the reserved arch will average the required thickness in each place, and be estimated and paid for as of that thickness, and no allowance will be made to the contractor for filling up any excess of size in the excavation of the trench.

19. Full directions, with drawings of the mode of construction, whether of brick alone, or of brick, stone, or concrete in whole or in part, in each portion of the work, will be given by the engineer from time to time, and he will be the judge as to which mode of construction is to be adopted in each portion of the work.

20. Before the centres are struck, the ground between the arch and the bank in cuts and the top of embankments over low grounds will be well cleared of all rubbish, and such space as may be required will be filled with fine water-tight earth, and be well rammed or puddled to support the haunches of the arch.

21. *Embankment and back filling.*—After clearing off the space between the conduit and the sides of cuts and the top of the embankments, the banks above grade will be carried up. These will, so far as practicable, be carted in and spread in layers of three inches in depth.

22. When earth is required to be rammed, it will be done (in courses not exceeding three inches in depth) with a heavy maul of iron or wood, and will be packed evenly and uniformly to prevent uneven settlement. Where puddling is required, the earth will be spread in layers not exceeding six inches in depth, and each course will be well sprinkled with water and tramped, and then be cut through with a



spade or shovel into the ground or course below, water being added as the cutting goes on, until it is worked into a stiff and cohesive mass before another course is commenced. The quantity, quality, and disposition of rammed and puddled earth will be regulated by the engineer. It will be measured, estimated, and paid for as an embankment carried into bank, to which the price affixed in the following proposal for ramming or puddling, as the case may be, will be additional.

23. No logs, trees, stumps, brushwood, roots, leaves, grass, or stones, shall be left in or admitted into any part of the embankment; and no frozen earth or clods will be admitted, except by special permission of the engineer, and then only in the outer edge of the embankment.

24. The banks, when finished, will be made smooth on the top and slopes; and, when complete, the soil and muck which may be reserved for this purpose will be thrown upon the top and slopes, and be trimmed to conform to them.

25. All work done under these specifications will be in all respects in strict conformity with the directions of the engineers, and any work which they may require and which may not be specified will be valued by the engineer in charge, and his decision shall be final and without appeal.

26. No ardent spirits shall be used or allowed on any part of the work, and no disorderly person or persons objected to by the engineer shall be retained in the employment of the contractor. Permitting men to board where ardent spirits are used or sold, though the premises should not be under the control of the contractor, will be considered a violation of this rule; any violation of it will be considered sufficient ground for the engineer to declare the contract void.

27. *Mortar*.—The mortar for masonry will be made of two and a half parts, by measure, of clean, sharp, well screened sand to one part of cement. It will be mixed on a bed of plank, to be approved by the engineer. The mortar bed will be protected by a canvas shelter from soaking rains or drying sun.

28. The sand and cement, after being measured, will be mixed dry, and small quantities only, taken from the heap, will be mixed with water as required.

29. The time from the first wetting of the cement to the using of the mortar shall not exceed half an hour.

30. Cement will be furnished by the United States at their cement houses on the bank of the canal, from which it will be transported by the contractor at his own cost. It will be drawn upon the written orders of the engineer, who will be the sole judge as to which depot it shall be drawn from, and shall express the same in said orders. The quantity shall not in any case exceed six hundred pounds to each thousand brick, nor three hundred pounds to each cubic yard of stone laid. Either in masonry or concrete, any excess over this will be charged to the contractor, at the rate of fifty cents per hundred pounds. Any unnecessary waste of cement detected by the engineer will also be charged against the contractor at the same rate, whether the prescribed quantity be used in the work or not; and of the proper care exercised by the contractor the engineer shall be the judge. The contractor will be required to provide sheds for keeping the cement at the work



dry and secure from the weather, and he will also return the bags or barrels, if required, to the United States.

31. Sand will be furnished by the United States on the bank of the canal. It will be hauled by the contractor at his own cost, and deposited upon beds to be by him prepared for it, to be approved by the engineer. It must be transported, deposited, and used without waste, and any waste will be charged to the contractor.

32. He will be required to haul sand in advance of his work, if necessary, to clear the binns and landings for the reception of additional sand.

33. Bricks will be furnished by the United States, delivered upon the banks of the canal, or at some other point equally convenient, and will be transported to the work by the contractor for masonry. The landings from which they are to be taken will be designated by the engineer.

34. It is expressly stipulated that, although the United States agrees to furnish the materials above named, and will make every effort to do the same, yet that if from any cause there should be delay or failure on the part of the said United States, there shall not be any claim for damages on the part of said contractors against the United States.

35. The forms and the centres for laying the conduit will be furnished by the United States at the rate of three hundred feet of centres for each gang of not less than twelve bricklayers, but the contractor for the conduit will be required to transport them from the bank of the canal to his work, and from any one part of it where they may have been deposited or used to any other part where they may be needed; he will set them under the direction of the engineer, and he will be required to take proper care that they be not unnecessarily damaged. If damaged, they will be repaired by the United States at the expense of the contractor. He will also give due notice to the engineer of the time when he will need centres, cement, and sand, and of the quantity of each.

36. All work done under this specification will be in all respects in strict conformity with the directions of the engineer, and any work which he may require to be done, and which may not be particularly specified, will be valued by the engineer, and his decision will be final and without appeal.

37. The subscriber offers to contract to do all the work required to prepare for, lay, and embank over the conduit on sections Nos. 14 and 15, at prices stated in the following table, and to complete the work according to the preceding specifications, and upon the terms and conditions stipulated in the contract which he may hereafter subscribe, in the form of a copy of which has been shown to and read by him.

TRIMMING FOR CONDUIT.	EXCAVATION OF SOLID ROCK.		LAYING CONDUIT.			EMBANKMENT AND BACK FILLING.		
Below grade.	Below grade.	Above grade.	Brick.	Stone.	Concrete.	Embankment proper.	Ramming.	Puddling.
Per lineal foot.	Per cubic yard.	Per cubic yard.	Per 1,000.	Per cubic yard.	Per cubic yard.	Per cubic yard.	Per cubic yard.	Per cubic yard.
Trimming the trench below grade and preparing it for the conduit.	Excavation of solid rock found in the trench below grade.	Excavation of solid rock above grade in the cuts which may be left by the graduation contractor, and which the contractor for conduit will be required to complete.	Laying bricks in the conduit, including the transportation of cement, sand, and brick from the canal or depots to the work.	Laying stone in conduit when required, including furnishing the stone and its transportation to the work, and the transportation of cement and sand from the canal or depots to the work, and plastering the inner face.	Concrete where required, including the furnishing, transportation and breaking of stone, and the mixing and putting in of the concrete to the required form, and transportation of cement and sand from the canal or depots to the work.	Embankment placed around and over the conduit, whether taken from the cuts or borrowed.	Ramming earth—in addition to the price paid for it as embankment.	Puddling earth—in addition to the price paid for it as embankment.
\$0 25	\$2 25	\$1 12	\$5 50	\$4 00	\$3 00	\$0 25	\$0 12	\$0 25

Signed by us, this sixth day of May, in the year of our Lord 1857.

MICHAEL S. CARMAN,  
FREDERICK WEHR,

RICHARD J. DORBINS,  
RT. McCAY.

To Captain M. C. Meigs, *United States Engineers*:

We, the undersigned, residents of ———, in the State of ———, hereby, jointly and severally, covenant with the United States, and guaranty, in case the foregoing bid of ——— be accepted, that he or they will, within ten days after the acceptance of the said bid, execute a contract for the same, with good and sufficient sureties, to perform the work in conformity to the terms of the advertisement and specifications under which it was made. And in case the said ——— shall fail to enter into contract as aforesaid, we guaranty to make good the difference between the offer by the said ——— and the next lowest bidders.

I hereby certify that, to the best of my knowledge and belief, the above named guarantors are good and sufficient.

## WASHINGTON AQUEDUCT.

*Contract for the Receiving Reservoir.*

Agreement between Daniel Stone, of Philadelphia, State of Pennsylvania, of the first part, and Captain M. C. Meigs, of the corps of United States engineers, of the second part, acting under the authority of, and for and in behalf of the United States of America, as engineer in charge of the Washington aqueduct, witnesseth :

1. That the party of the first part, for and in consideration of the matters hereinafter referred to and set out, covenants and agrees with the party of the second part to clear, grub, muck, excavate, embank, ram, and puddle, and do all other work required for the construction of the receiving reservoir, and to do the same in conformity to the specifications hereto annexed, which are to be taken as a part of this contract, and according to the directions from time to time to be given by the engineer.

2. The principal assistant engineer, or an assistant engineer, by his direction, shall, as soon as practicable after the end of each month, make out an estimate of the quantity and value of each species of work done pursuant to this contract, at the prices contained in the annexed proposal. He shall also include the value of any extra work done in consequence of any alteration of the plan of the reservoir which may have been adopted by the said engineer in charge, when such alteration shall have caused an increased expense to the contractor; and when any such alteration shall have caused a saving of expense to the contractor, the engineer shall make a reasonable deduction therefor from the estimate so made; and if the said engineer in charge of the aqueduct shall approve said estimate, it is mutually agreed between the contracting parties that it shall be binding, and shall be paid by said engineer.

3. Within ten days after the return of any monthly estimate to the engineer in charge, nine-tenths of the sum appearing to be due, for work performed since the preceding estimate, shall be paid to the contractor.

4. Within thirty days after the work shall have been completed, and accepted by the engineer, a final estimate therefor shall be made and approved in the manner provided for making and approving monthly estimates, and shall in like manner be paid by said engineer in charge, together with the retained per centage.

5. The work shall always be open to examination during its progress by the engineers or other persons they may depute for that purpose, and the contractor shall, at all times, at his own expense, keep open a pathway alongside of the work, so that the above mentioned persons may readily pass by the same to the work above or below it.

6. At the expiration of every two weeks' work a report shall be made by the contractor to the assistant engineer having charge of this work of the average force of men, carts, &c., employed upon it for the preceding two weeks, according to such forms as shall be supplied by the engineer.

7. It is mutually agreed between the parties to this contract, that

the work aforesaid shall be commenced within ten days after the notification of the approval of this contract, if the United States shall so soon acquire the right to the land necessary for the work, or as soon thereafter as the said right shall have been acquired; that it shall be steadily prosecuted without intermission, with such force as shall, in the opinion of the engineer, secure its final completion within six months after the contractor is put in possession of the site, unless prevented or delayed by written orders from the engineer in charge, at the end of which time it shall be fully completed and delivered up; and it is further agreed that, in the event that the said work shall not be commenced, prosecuted, and completed, or if the contractor, on being required thereto by the written order of the engineer in charge, the principal assistant engineer, or his assistant engineer, shall fail or refuse to increase the force employed on the work to such extent as, in the opinion of the engineer, shall be necessary to insure its completion in the stipulated time, or in case the contractor shall disobey any of the written orders of either of said engineers, or shall violate any of the conditions of this agreement, then, on a certificate of the fact by the principal assistant engineer made to the engineer in charge, the said engineer in charge may declare this contract forfeited, and thereupon the same shall then become null and void, and the United States shall thereupon be exonerated from every obligation thence arising; and the reserved per centage on the contract price, as well as all materials furnished and work performed, and upon which no estimate or payment may have been made, shall be forfeited to and become the right and property of the United States, and the said engineer in charge may thereafter agree with any other person for the execution of the unfinished work, or may complete the same by day's work; and the said party of the first part shall have no appeal from the opinion and decision aforesaid, and he hereby releases all right to except to or question the same, in any place, or under any circumstances whatever; but the party of the first part shall still remain liable to the party of the second part for the damages occasioned to him by the said failure, refusal, or disobedience; and it is further agreed between the parties, that in order to secure the punctual performance of the covenants above made by the party of the first part, and to indemnify and protect the party of the second part from loss, in case of default and forfeiture of this contract, the said party of the second part shall be authorized to retain in his hands, until the completion of the contract, *ten per cent.* on the amount of monies at any time due to the said party of the first part.

8. The contractor for this work shall not knowingly employ any man, either as overseer, laborer, or in any situation, who shall have been dismissed, by the order of the engineer, from any other part of the work for bad workmanship, intemperance, or disorderly conduct. Nor shall he continue to employ any man who shall be declared by the engineer to be either disorderly, habitually intemperate, or a bad workman.

9. The contractor shall give his personal attention to the execution of the work hereby contracted for.

10. All buildings or fences adjacent to the reservoir shall be pre-

served, in such manner as the engineer may direct, by the contractor, who shall protect them from injury by his hands, and, as far as practicable, by any other persons.

11. The engineer shall have the power to prescribe the manner of preparing for, beginning, and conducting every species of work to be done under this agreement with reference to its purpose and the durability of the work, and his instructions shall be promptly obeyed; and if he shall disapprove of the quality of any work, it shall be the duty of the contractor to take down at his own expense and rebuild so much thereof as shall be disapproved of; and if the contractor shall neglect or refuse to take down and rebuild work so disapproved of, the engineer shall cause the same to be done at his cost.

12. It is understood and agreed that all orders given by an engineer which shall cause an increase or diminution in the quantity or value of the work to be performed, shall be given in writing, and that when any claim shall be made by the contractor for extra compensation for work performed under such orders, the orders shall be produced; and that all claims for extra work shall be made on or before the close of the month in which it is claimed to have been done, or it shall not be paid for at all.

13. It is further agreed that in case of the death, resignation, removal, or absence of any engineer, the United States, by its proper officers, may depute any other engineer to act in his place.

14. The United States reserves the right to suspend the work under this contract at any time; and when the work has been faithfully performed by the contractor, he will be paid in full for all the work done up to the time of such suspension.

15. Payments will be made to the contractor in drafts upon the Treasury of the United States for coin. No estimate after the first shall be paid, unless the engineer is satisfied that the hands employed upon the work have been paid for the work of the month preceding, as provided in the advertisement under which this contract is made, a copy of which is hereto annexed.

16. And it is further stipulated and agreed that no member of Congress shall be admitted to any share or part in this contract or agreement, or to any benefits to arise therefrom; and this contract shall be in all its parts subject to the terms and conditions of an act of Congress, passed on the twenty-first day of April, in the year of our Lord one thousand eight hundred and eight, entitled an "Act concerning public contracts:"

And this contract is also expressly understood to be subject to the terms and conditions of the joint resolution of Congress approved April 14, 1852, containing a proviso in the following terms, to wit: "*Provided*, Nothing herein contained shall be so construed as to authorize any officer of the United States to bind the United States by contract beyond the amount appropriated by Congress, or to sanction any such contract heretofore made:" *Provided, also*, That it is expressly understood and agreed that this contract, nor any part thereof, shall not be sublet nor assigned; but that it shall be well and truly carried out and fulfilled in good faith by the above recited party of the first part, and that all payments on account thereof shall be made

to the aforesaid party of the first part, his heirs, executors, or administrators.

17. And for the true and faithful performance of all and singular the covenants, articles, and agreements hereinbefore particularly set forth, the subscribers hereunto bind themselves, jointly and severally, their and each of their successors, heirs, executors, and administrators.

18. Thus covenanted and agreed by the said parties this twenty-sixth day of May, in the year of our Lord one thousand eight hundred and fifty-seven, (1857,) as witness their hands and seals.

DANIEL STONE, [SEAL.]

M. C. MEIGS, [SEAL.]

*Captain of Engineers in charge of Washington Aqueduct.*

(Done in quadruplicate.)

Witness: WILLIAM H. BRYAN.

#### WASHINGTON AQUEDUCT.

##### *Specification for the Receiving Reservoir at Powder Mill Branch.*

1. The receiving reservoir, containing about sixty acres, chiefly arable land, will be well cleared and grubbed within the flowage line. Outside of this, generally for a width of about twenty feet, the ground will be cleared and ploughed, and all timber, stumps, brush, roots, leaves, &c., throughout, will be removed or burned, as may be directed.

2. From the whole surface of the ground to be covered by water, all muck, vegetable mould, &c., will be removed to such depth as may be required; and the mucking so removed will be distributed around the sides, and will form a bank. This bank will have an inner slope of two feet base to one foot rise, and its top will slope from the reservoir so as to form a road and drain.

3. Where the ground within the flowage line is such that the water would not be five feet deep upon it, it will be excavated in parts to give that depth, and the material so excavated will be made into embankment upon other parts, which will be raised above the water level. The slopes of these excavations and embankments will have bases of two feet to a rise of one foot, except when otherwise directed.

4. After the reservoir shall have been completed, as above described, a cut will be made through the hill on the southwest side fifty feet wide at the level of the flowage line, and so much of the material thus excavated as may be necessary to form a dam across the valley of the stream, and a stone facing for the same, will be carted into it. A cut will also be made leading from the reservoir to the gate-house, and a side cut to provide an overfall. These two, with the excavation of the pit for the gate-house, and for any other mechanical structures, the contractor for the reservoir may be required to do at his prices for other excavation.



5. All the excavation, when carried into the bank for the dam, will be spread in three-inch layers, and such parts of the bank as the engineer may deem necessary the contractor will ram or puddle.

6. The face of the dam next to the water will be protected by a rip-rap of stone, which will be laid in compactly and evenly, as the work goes on.

7. Before any material is deposited upon the site of the dam the whole of the ground to be covered by its base will be carefully cleared, grubbed and cleaned out, and a puddle-ditch across it will be carefully excavated to a good water-tight material.

8. Provision will perhaps be made to carry off a portion of the water of the stream through tunnel No. 4; but the contractor for the reservoir will be required, at his own cost, to provide for the passage of a part, or, if this work is begun before the completion of the tunnel, the whole over the sides of the embankment, and in such manner that the embankment will not be injured, the plan of doing which must be approved by the engineer.

9. Should the material found in the necessary excavation be deemed of a quality not sufficiently water-tight for the dam, clay for the puddled or rammed part will be obtained from without the reservoir. It will be measured in the borrow pit, and will be estimated and paid for at the price of other excavation.

10. The contractor will be required to commence and carry on this work at such time, at such points, and in such manner as the engineer may direct.

11. Detached stone, containing less than fifteen cubic feet, will be included in the third class of excavation, (see Item 4 of the following proposal;) all others, less than one cubic yard, will be included in soft rock, (Item No. 3.)

12. It is understood that soft or rotten rock is such as cannot be excavated by the shovel, spade, plough, or pick alone, but requires the use of the crowbar and pick to break it up, yet is not hard enough to require drilling and blasting.

Hard rock is such as requires drilling and blasting in order to be broken up.

Materials not included in the above two items will be estimated as earth or mucking.

Of this classification the engineers will be the judges; the decision of the engineer in charge will be final in case of difference between the local engineer and the contractor.

13. The price for excavation will cover the transportation to the point where it is required to be placed in the bank.

14. When earth is required to be rammed, it will be done (in courses not exceeding three inches in thickness) with a heavy maul of iron or wood, and will be packed evenly and uniformly to prevent uneven settlement. Where puddling is required, the earth will be spread in layers not exceeding six inches in depth, and each course will be well sprinkled with water and tramped, and then be cut through with a spade or shovel into the ground or course below, water being added as the cutting goes on, until it is worked into a stiff and cohesive mass, before another course is commenced. The quantity,



quality, and disposition of rammed and puddled earth will be regulated by the engineer. It will be measured, estimated, and paid for as excavation carried into bank, to which the price affixed in the following proposal for ramming or puddling, as the case may be, will be additional.

15. No logs, trees, stumps, brushwood, roots, leaves, grass, or stones shall be left in or admitted into any part of the embankment; and no frozen earth or clods will be admitted, except by special permission of the engineer, and then only in the outer edge of the embankment.

16. The banks, when finished, will be made smooth on the top and slopes; and when complete the soil and muck which may be reserved for this purpose will be thrown upon the top and slopes, and be trimmed to conform to them.

17. All work done under these specifications will be in all respects in strict conformity with the directions of the engineers, and any work which they may require and which may not be specified will be valued by the engineer in charge; and his decision shall be final and without appeal.

18. No ardent spirits shall be used or allowed on any part of the work, and no disorderly person or persons, objected to by the engineer, shall be retained in the employment of the contractor. Permitting men to board where ardent spirits are used or sold, though the premises should not be under the control of the contractor, will be considered a violation of this rule; any violation of it will be considered sufficient ground for the engineer to declare the contract void.

19. *Extra work.*—No allowance for extra work, beyond that specified, shall be made, except such as shall have been done by the special written order of the engineers. All claims for extra work must be presented to the engineer at the end of the month in which such extra work shall have been done, to be settled in the estimate of work done within that month, or they will not be considered.

20. *Monthly estimates.*—Monthly estimates will be made between the first and tenth of each month approximate of the whole amount of work done within the month; and as soon thereafter as practicable a payment will be made of nine-tenths of such estimates. But should the contractor abandon the work or the engineer declare the contract void, all the work not paid for, as well as the retained per centage, will be forfeited to the United States.

21. No contractor will be allowed to sublet the whole or any portion of his work, but will be required to give his personal and constant attention to the work during its progress.

22. The subscriber offers to contract to do all the work required to construct the receiving reservoir at the prices mentioned in the following table, and to complete the work according to the preceding specification, and upon the terms and conditions stipulated in the contract which he may hereafter subscribe, in the form a copy of which has been shown to and read by him.

GRUBBING.	EXCAVATION.			PUDDLING.	RAMMING.
The reservoir.	Per cubic yd.	Per cubic yd.	Per cubic yd.	Per cubic yard.	Per cubic yd.
Grubbing and clearing the trees, brush, stumps, roots, muck, &c., in the space required for the reservoir and its banks.	Of solid rock requiring blasting.	Of soft rock and detached rock containing over fifteen cubic feet and less than one cubic yard.	Of gravel, earth, and loose stone, or any material other than that described in Nos. 2 and 3 of this table.	Puddling, of materials paid for as excavation, in addition to the price for excavation.	Ramming, of materials paid for as excavation, in addition to the price for excavation.
\$1,200 00	\$1 50	\$0 50	\$0 20	\$0 13	\$0 08

Signed by me this fifth day of May, 1857.

DANIEL STONE.

To Capt. M. C. MEIGS, *U. S. Engineers*:

We, the undersigned, residents of \_\_\_\_\_ in the State of \_\_\_\_\_ hereby jointly and severally covenant with the United States, and guaranty, in case the foregoing bid of \_\_\_\_\_ be accepted, that he or they will, within ten days after the acceptance of said bid, execute a contract for the same, with good and sufficient sureties to perform the work in conformity to the terms of the advertisement and specifications under which it was made. And in case the said \_\_\_\_\_ shall fail to enter into contract as aforesaid, we guaranty to make good the difference between the offer by the said \_\_\_\_\_ and the next lowest bidders.

I hereby certify that, to the best of my knowledge and belief, the above named guarantors are good and sufficient.

WASHINGTON AQUEDUCT.

*Contract for Iron Pipes, Branches, and Bends.*

1. Agreement between J. W. and J. F. Starr, of Camden, in the State of New Jersey, of the first part, and Captain M. C. Meigs, of the corps of United States engineers, of the second part, acting for and in behalf of the United States of America, as engineer in charge of the Washington Aqueduct, witnesseth:

2. That the party of the first part, for and in consideration of the matters hereinafter referred to and set out, covenants and agrees with the party of the second part to furnish and deliver, at the proper cost

of the said party of the first part, upon such wharf or wharves in Washington and Georgetown as may be designated by the party of the second part, all the iron pipes, branches, and bends, described and referred to in the printed advertisement and specifications, copies of which are hereto annexed, which are to be deemed and taken as a part of this contract; to be delivered in such quantities and at such times as may be required by the party of the second part.

3. And the party of the second part, for and in consideration of the premises, covenants and agrees to pay the party of the first part at the rate specified in the annexed specification and proposal for every ton of 2,240 lbs. of iron pipe, bends, or branches, which shall have been delivered by the said party of the first part, under and in conformity with the terms of this contract; and that the payments shall be made monthly, if so required by the party of the first part.

4. Provided, nevertheless, that in case the party of the second part shall at any time be of opinion that this contract is not duly complied with by the party of the first part, or that it is not in due progress of execution, or that the party of the first part is irregular or negligent, in such case he shall be authorized to declare this contract forfeited, and thereupon the same shall become null and void, and the United States shall thereupon be exonerated from every obligation thence arising; and the reserved per centage on the contract price, as well as all the materials furnished upon which no estimate or payment may have been made, shall be forfeited to and become the right and property of the United States; and the party of the second part may thereafter agree with any other person for the execution of the remainder of the work; and the party of the first part shall have no appeal from the opinion and decision aforesaid, and he hereby releases all right to except to or question the same, in any place or under any circumstances whatever; but the party of the first part shall still remain liable to the party of the second part for the damages occasioned to him by the said failure or refusal; and it is further agreed between the parties, that in order to secure the punctual performance of the covenants above made by the party of the first part, and to indemnify and protect the party of the second part from loss in case of default and forfeiture of this contract, the said party of the second part shall be authorized to retain in his hands, until the completion of the contract, *ten per cent.* on the amount of moneys at any time due to the said party of the first part.

5. It is further agreed that in case of the death, resignation, removal, or absence of any engineer, the United States, by its proper officers, may depute any other engineer to act in his place.

6. The United States reserves the right to suspend the work under this contract at any time; and when the work has been faithfully performed by the contractor, he will be paid in full for all work done up to the time of such suspension.

7. And it is further stipulated and agreed that no member of Congress shall be admitted to any share or part in this contract or agreement, or to any benefits to arise therefrom; and this contract shall be in all its parts subject to the terms and conditions of an act of Congress passed on the twenty-first day of April, in the year of our Lord

one thousand eight hundred and eight, entitled "An act concerning public contracts."

And this contract is also expressly understood to be subject to the terms and conditions of the joint resolution of Congress approved April 14, 1852, containing a proviso in the following terms, to wit: "Provided, Nothing herein contained shall be so construed as to authorize any officer of the United States to bind the United States by contract beyond the amount appropriated by Congress, or to sanction any such contract heretofore made:" *Provided, also,* That it is expressly understood and agreed that this contract, nor any part thereof, shall not be sublet nor assigned; but that it shall be well and truly carried out and fulfilled in good faith by the above recited party of the first part, and that all payments on account thereof shall be made to the aforesaid party of the first part, his heirs, executors, or administrators.

8. And for the true and faithful performance of all and singular the covenants, articles, and agreements herein before particularly set forth, the subscribers hereunto bind themselves, jointly and severally, their and each of their successors, heirs, executors, and administrators.

9. Thus covenanted and agreed by the said parties this sixth day of August, in the year of our Lord one thousand eight hundred and fifty-seven, (1857,) as witness their hands and seals.

J. W. & J. F. STARR, [SEAL.]  
M. C. MEIGS, [SEAL.]

*Captain of Engineers, Chief Engineer Washington Aqueduct.*

(Done in quadruplicate.)

Witnesses to signature of Messrs. Starr:

B. A. SRAU,  
WM. E. LAFFERTY.

Witnesses to signature of Captain Meigs:

Z. W. DENHAM,  
WM. G. MOORE.

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WASHINGTON AQUEDUCT.

*Specifications for Cast-iron Pipes.*

Sealed proposals will be received at the office of the Washington Aqueduct, Washington, till the 7th May, 1857, for the following cast-iron pipes, branches, and bends, viz:

- 19 pipes, 9 feet long, 48 inches interior diameter,  $1\frac{1}{2}$  inch thick.
- 5 pipes, 9 feet long, 30 inches interior diameter,  $1\frac{1}{8}$  inch thick.
- 5 pipes, 9 feet long, 12 inches interior diameter,  $\frac{5}{16}$  of an inch thick.
- 2 reducing pipes, 48 inches to 12 inches,
- 1 reducing pipe, 48 inches to 30 inches.
- 2 hemispherical stops, for ends of 48-inch pipes.
- 5,837 pipes, 9 feet long, 12 inches interior diameter,  $\frac{3}{4}$  of an inch thick.

30 branches, 4 way.....12  $\frac{4}{69^\circ \diagup 111^\circ \diagdown 4}$  12.....angles  $69^\circ$  and  $111^\circ$ .

1 branch, 3 way.....12  $\frac{4}{69^\circ \diagup 111^\circ}$  12.....angles  $69^\circ$  and  $111^\circ$ .

1 branch, 4 way .....12  $\frac{4}{69^\circ \diagup 111^\circ}$  12.....angles  $69^\circ$  and  $111^\circ$ .

2 branches, 4 way.....12  $\frac{12}{69^\circ \diagup 111^\circ}$  12.....angles  $69^\circ$  and  $111^\circ$ .

2 branches, 4 way.....6  $\frac{12}{90^\circ}$  6.....right angles.

34 branches, 4 way.....12  $\frac{4}{90^\circ}$  12.....right angles.

9 branches, 3 way.....12  $\frac{4}{90^\circ}$  12.....right angles.

Bends for 12-inch main :

2 of  $90^\circ$  curvature : radius of curvature of axis, 6 feet.  
 3 of  $111^\circ$  " " " " "  
 1 of  $21^\circ$  " " " " "

The size named to be inside diameter, and each pipe to be 9 feet in length.

The joint to be what is termed the spigot and faucet joint, excepting that one of the 48-inch pipes will have a flange joint at one end and a spigot at the other.

The 48-inch and 30-inch pipes, the reducing pieces, and eleven of the 12-inch pipes to have strong lugs, or horns, cast on each end, for fastening them together with wrought iron links.

The spigot ends of all the branches and both ends of the bends to have similar lugs.

The average weight of the 12-inch pipes to be 672 pounds ; 12-inch

pipes, weighing less than 650 pounds, will be rejected. If the total weight of all the 12-inch pipes exceeds the average, the excess will not be paid for. All the pipes to pass the usual inspection and proof of 300 pounds to the square inch; to be of uniform thickness throughout, of strong, tough iron, free from all imperfections whatever, and such as will bear drilling and cutting.

Proposals will state whether the pipes are to be from blast furnace iron or re-melted iron; and, if from blast furnace iron, will specify the name of the mine, &c., and the ore used.

The pipes to be delivered on such wharf as may be designated by the engineer, in Washington or Georgetown, D. C., as follows:

19 48-inch pipes.....	} by 1st July, 1857. October.
5 30-inch pipes.....	
3 reducing pieces.....	
2 hemispherical stops.....	
5 12-inch pipes, with lugs..	

Time of first delivery extended to 1st October in consequence of delay in awarding contract.

M. C. MEIGS.

1,000 12-inch pipes.....	by 1st November.
1,000 " " .....	by 1st December.
1,000 " " .....	by 1st January, 1858.
1,000 " " .....	by 1st February.
1,837 " " .....	by 1st March.

The branches to be delivered in due proportion with the pipes, as required, from time to time.

A specific price per ton of 2,240 lbs. to be named for the pipes and branches and bends.

Payments will be made in cash, by checks, for coin on the United States treasury, immediately after the inspection and proof of each parcel is completed—reserving 10 per cent. until the completion of the contract.

All the pipes to conform in dimensions and in every particular to the drawings to be furnished by the engineer.

The pipes to be made of the best quality of iron remelted.

#### PROPOSAL.

The subscribers offer to contract for furnishing the above described pipes, branches, bends, &c., in conformity to the preceding specifications, and upon the terms and conditions stipulated in the contract which they may hereafter subscribe, in the form a copy of which has been shown to and read by them, at the prices following, to wit:

For 48-inch pipes, per ton, of 2,240 lbs.....	\$60 00
For 30-inch pipes, " 2,240 lbs.....	44 80
For 12-inch pipes, " 2,240 lbs.....	39 00
For bends, " 2,240 lbs.....	44 80
For branches, " 2,240 lbs.....	44 80

Signed by us, this sixth day of August, in the year of our Lord 1857.

J. W. & J. F. STARR.



To Capt. M. C. MEIGS, *United States Engineers* :

I, the undersigned, resident of Washington city, in the District of Columbia, hereby, jointly and severally, covenant with the United States, and guaranty, in case the foregoing bid of J. W. & J. F. Starr, of Camden, New Jersey, be accepted, that he or they will, within ten days after the acceptance of the said bid, execute a contract for the same, with good and sufficient sureties, to perform the work in conformity to the terms of the advertisement and specifications under which it was made. And in case the said J. W. & J. F. Starr shall fail to enter into contract as aforesaid, I guaranty to make good the difference between the offer by the said J. W. & J. F. Starr and the next lowest bidders.

J. F. BROWN.

I hereby certify that; to the best of my knowledge and belief, the above named guarantors are good and sufficient.

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WASHINGTON AQUEDUCT.

*Contract for Cut Stone.*

1. Agreement between Frederick and Feild, of Quincy, in the State of Massachusetts, of the first part, and Captain M. C. Meigs, of the corps of United States engineers, of the second part, acting for and in behalf of the United States of America, as engineer in charge of the Washington aqueduct, witnesseth :

2. That the party of the first part, for and in consideration of the matters hereinafter referred to and set out, covenants and agrees with the party of the second part to furnish and deliver, at the proper cost of the said party of the first part, upon such wharf or wharves in Washington and Georgetown as may be designated by the party of the second part, or upon lighters or scows in the harbor of Washington or Georgetown, D. C., all the cut granite arch stones described and referred to in the printed specifications and proposals, a copy of which is annexed to and is to be deemed and taken as a part of this contract, and to do the same in conformity to said specifications and proposal, and to the directions he may from time to time receive from the engineer.

3. And the party of the second part, for and in consideration of the premises, covenants and agrees to pay to the party of the first part, for all arch stones which shall have been delivered by the said party of the first part, under and in conformity with the terms of this contract and proposal, and which shall have been inspected and accepted by the said party of the second part, at the rates per cubic foot specified in the said proposal and specifications hereto attached.

4. Provided, nevertheless, that in case the party of the second part shall at any time be of opinion that this contract is not duly complied with by the party of the first part, or that it is not in due progress of execution, or that the party of the first part is irregular or negligent,



in such case he shall be authorized to declare this contract forfeited, and thereupon the same shall become null and void, and the United States shall thereupon be exonerated from every obligation thence arising; and the reserved per centage on the contract price, as well as all the materials furnished upon which no estimate or payment may have been made, shall be forfeited to and become the right and property of the United States; and the party of the second part may thereafter agree with any other person for the execution of the remainder of the work; and the party of the first part shall have no appeal from the opinion and decision aforesaid, and he hereby releases all right to except to or question the same, in any place or under any circumstances whatever; but the party of the first part shall still remain liable to the party of the second part for the damages occasioned to him by the said failure or refusal; and it is further agreed between the parties that, in order to secure the punctual performance of the covenants above made by the party of the first part, and to indemnify and protect the party of the second part from loss in case of default and forfeiture of this contract, the said party of the second part shall be authorized to retain in his hands, until the completion of the contract, *ten per cent.* on the amount of moneys at any time due to the said party of the first part.

5. It is further agreed that in case of the death, resignation, removal, or absence of any engineer, the United States, by its proper officers, may depute any other engineer to act in his place.

6. The United States reserves the right to suspend the work under this contract at any time; and when the work has been faithfully performed by the contractor, he will be paid in full for all work done up to the time of such suspension.

7. And it is further stipulated and agreed that no member of Congress shall be admitted to any share or part in this contract or agreement, or to any benefits to arise therefrom; and this contract shall be in all its parts subject to the terms and conditions of an act of Congress, passed on the twenty-first day of April, in the year of our Lord one thousand eight hundred and eight, entitled "An act concerning public contracts."

And this contract is also expressly understood to be subject to the terms and conditions of the joint resolution of Congress, approved April 14, 1852, containing a proviso in the following terms, to wit: "Provided, Nothing herein contained shall be so construed as to authorize any officer of the United States to bind the United States by contract beyond the amount appropriated by Congress, or to sanction any such contract heretofore made:" *Provided, also*, that it is expressly understood and agreed that this contract, nor any part thereof, shall not be sublet nor assigned; but that it shall be well and truly carried out and fulfilled in good faith by the above recited party of the first part, and that all payments on account thereof shall be made to the aforesaid party of the first part, his heirs, executors, or administrators.

8. And for the true and faithful performance of all and singular, the covenants, articles, and agreements hereinbefore particularly set

forth, the subscribers hereunto bind themselves, jointly and severally, their and each of their successors, heirs, executors and administrators.

9. Thus covenanted and agreed by the said parties this twenty-fourth day of August, in year of our Lord one thousand eight hundred and fifty-seven, (1857,) as witness their hands and seals.

ELEASER FREDERICK, [SEAL.]

WILLIAM FIELDS, [SEAL.]

M. C. MEIGS, [SEAL.]

*In charge of Washington Aqueduct.*

(Done in quadruplicate.)

Witnesses :

ASA S. JOHNSON,

HORACE JOHNSON.

Witness to signature of Capt. M. C. Meigs :

WM. G. MOORE.

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#### WASHINGTON AQUEDUCT.

#### *Specifications for Cut Stone for the Washington Aqueduct.*

1. There are required 131 courses of voussoirs or arch stones—each course 20 feet 4 inches long, from outside to outside ; to be from 6 feet 2 inches by 6 feet, to 4 feet 2 inches by 3 feet 6 inches, and about two feet in thickness, carefully worked to the proper wedge shape, as shown on detailed drawings to be furnished.

2. All to be got out in courses ; each alternate course to consist of 4 and of 5 stones. No lap to be less than 18 inches.

3. All to be dressed perfectly smooth, straight, and plane or out of wind on the beds or joints normal to the curve of the arch, without any deficiency whatever.

4. To lay joints of not more than one-eighth of an inch each.

5. The heads which show, and the soffits and backs and end joints, to be rough hammer-dressed, with a bevel of two inches on the edges of the soffit and head.

6. The end joints to be full and square with soffit, to lay not more than  $\frac{1}{4}$  inch joint of mortar for two-thirds of the depth from the soffit, and to have no deficiency greater than to make a one-inch joint in any part of it.

7. Proposals will state the quarry from which the stone is to be delivered, and should be accompanied by a specimen of the stone, unless the quarry and material is well known to the engineer.

8. The stone to be a sound, strong, hard, and durable granite, of a quality in all respects satisfactory to the engineer, and like the specimen submitted with the proposal.

9. The stone to be delivered on a wharf in Washington or Georgetown, to be designated by the engineer, or on lighters in the harbor of Washington or Georgetown.

10. A crane will be provided by the engineer for unloading the

stone, if delivered upon a wharf; but delivery upon lighters or scows in the harbor will be preferred, the scows to be provided by the engineer.

11. The proposals must state the time in which the whole will be delivered; and the time will be taken into consideration in deciding on the proposals.

12. The subscriber offers to contract to deliver for the Washington aqueduct, in conformity to the preceding specifications, and upon the terms and conditions of the contract which he may hereafter sign, in the form of which a copy has been shown to and read by him, all the cut and dressed granite arch stones which may be required from him for the bridges of the Washington aqueduct, at the following prices, viz:

*Quincy granite.*

For all arch stones containing not more than fifty cubic feet each, delivered, per cubic foot.....	\$1 20
For all arch stones containing more than fifty and not more than sixty cubic feet, delivered, per cubic foot.....	1 25
For all arch stones containing more than sixty cubic feet, per cubic foot.....	1 30

The delivery to commence forthwith, and all to be delivered by 30th June, 1858.

Signed by me, this 24th day of August, in the year of our Lord 1857.

FREDERICK & FEILD.

*To Captain M. C. Meigs, United States Engineers :*

We, the undersigned, residents of \_\_\_\_\_ in the State of \_\_\_\_\_ hereby, jointly and severally, covenant with the United States, and guaranty, in case the foregoing bid of \_\_\_\_\_ be accepted, that he or they will, within ten days after the acceptance of the said bid, execute a contract for the same, with good and sufficient sureties, to perform the work in conformity to the terms of the advertisement and specifications under which it was made. And in case the said \_\_\_\_\_ shall fail to enter into contract as aforesaid, we guaranty to make good the difference between the offer by the said \_\_\_\_\_ and the next lowest bidders.

I hereby certify that, to the best of my knowledge and belief, the above named guarantors are good and sufficient.

WASHINGTON AQUEDUCT.

*Contract for bricks.*

1. Agreement between William Douglas, of Washington city, D. C., of the first part, and Captain M. C. Meigs, of the United States corps of engineers, of the second part, acting under the authority of, and for and in behalf of the United States of America, as engineer in charge of the Washington aqueduct, *witnesseth:*

2. That the party of the first part, for and in consideration of the matters hereinafter referred to and set out, covenants and agrees with

the party of the second part to furnish and deliver, at the proper cost of said party of the first part, upon such wharf or landing, or part of the canal bank of the Chesapeake and Ohio canal, as may be designated by the party of the second part, and at such points in the vicinity of the line of the Washington aqueduct as may be agreed upon hereafter, ten to twelve millions of bricks, to be delivered and to be in all respects according to the terms of the specifications and advertisement hereto annexed, which are to be deemed and taken as a part of this contract.

3. The party of the second part covenants and agrees to put the party of the first part in possession of the brick yard now in the possession and occupancy of the said party of the second part, upon the Chesapeake and Ohio canal bank, between Georgetown and the Great Falls, with the machinery and appliances there prepared for making brick.

4. And the party of the second part further covenants and agrees to pay to the said party of the first part, for every thousand of bricks delivered in conformity to the terms of the specifications attached to this contract, and inspected and accepted by him as of suitable quality, the sum stated in the proposal and specifications herewith; said payment to be made in checks for coin upon the treasury of the United States, monthly, if desired by the party of the first part, upon the monthly estimates which shall be made by the engineer of the bricks so delivered and accepted; that is to say, ninety per centum of the whole amount thus found to be due, the remaining ten per centum being retained by the party of the second part until the full and entire completion of this contract, when it shall be paid to the party of the first part.

5. Provided, nevertheless, that in case the party of the second part shall at any time be of opinion that this contract is not duly complied with by the party of the first part, or that it is not in due progress of execution, or that the party of the first part is irregular or negligent, in such case he shall be authorized to declare this contract forfeited, and thereupon the same shall become null and void, and the United States shall thereupon be exonerated from every obligation thence arising; and the reserved per centage on the contract price, as well as all the materials furnished upon which no estimate or payment may have been made, shall be forfeited to and become the right and property of the United States; and the party of the second part may thereafter agree with any other person for the execution of the remainder of the work; and the party of the first part shall have no appeal from the opinion and decision aforesaid, and he hereby releases all right to except to or question the same in any place or under any circumstances whatever; but the party of the first part shall still remain liable to the party of the second part for the damages occasioned to him by the said failure or refusal; and it is further agreed between the two parties that, in order to secure the punctual performance of the covenants above made by the party of the first part, and to indemnify and protect the party of the second part from loss in case of default and forfeiture of this contract, the said party of the second part shall be authorized to retain in his hands, until the completion of the contract, *ten per cent.* on the amount of moneys at any time due to the said party of the first part.

6. It is further agreed that in case of the death, resignation, removal, or absence of any engineer, the United States, by its proper officers, may depute any other engineer to act in his place.

7. The United States reserves the right to suspend the work under this contract at any time; and, when the work has been faithfully performed by the contractor, he will be paid in full for all work done up to the time of such suspension.

8. And it is further stipulated and agreed that no member of Congress shall be admitted to any share or part in this contract or agreement, or to any benefits to arise therefrom; and this contract shall be, in all its parts, subject to the terms and conditions of an act of Congress, passed on the twenty-first day of April, in the year of our Lord one thousand eight hundred and eight, entitled "An act concerning public contracts."

And this contract is also expressly understood to be subject to the terms and conditions of the joint resolution of Congress approved April 14, 1852, containing a proviso in the following terms, to wit: "Provided, Nothing herein contained shall be so construed as to authorize any officer of the United States to bind the United States by contract beyond the amount appropriated by Congress, or to sanction any such contract heretofore made." *Provided, also*, That it is expressly understood and agreed that this contract, nor any part thereof, shall be sub-let nor assigned; but that it shall be well and truly carried out and fulfilled in good faith by the above recited party of the first part, and that all payments on account thereof shall be made to the aforesaid party of the first part, his heirs, executors, or administrators.

9. And for the true and faithful performance of all and singular the covenants, articles, and agreements hereinbefore particularly set forth, the subscribers hereunto bind themselves, jointly and severally, their and each of their successors, heirs, executors, and administrators.

10. Thus covenanted and agreed by the said parties this twenty-sixth day of May, in the year of our Lord one thousand eight hundred and fifty-seven, (1857,) as witness their hands and seals.

(Done in quadruplicate.)

WILLIAM DOUGLAS. [SEAL.]

M. C. MEIGS, [SEAL.]

*Captain of Engineers, in charge of Washington Aqueduct.*

Witness:

Z. W. DENHAM.

# WASHINGTON AQUEDUCT.

## *Specifications for bricks.*

1. Proposals will be received at this office until 7th of May next for furnishing ten millions of bricks for the Washington aqueduct.

2. The bricks must be delivered at such points on the banks of the Chesapeake and Ohio canal as may from time to time be designated by the engineer, or, if made at a distance from the canal, at such points in the vicinity of the line of the work as may be agreed upon.

3. The brick yard, machinery, and appliances for making brick,

prepared by the late contractors for brick for the aqueduct, and surrendered by them to the United States, will be placed at the service of the contractors for their use in making brick under these specifications.

4. There are large deposits of clay, suitable for making brick, in the vicinity of the line of the work and of the canal, and excellent clay is to be found in Washington and on the canal bank between Georgetown and Alexandria.

5. None but well made hard burnt bricks, entirely acceptable to the engineer, will be received, and they must be made in moulds conforming in size to the municipal regulations of Washington city.

6. Should it be necessary to import bricks made in other places, in order to supply the quantity needed this season, they must conform in size to those made in Washington, or a deduction proportionate to the difference in size will be made from the price to be paid for them.

7. The whole quantity of ten millions will be received this season, if the contractor is able to supply them. If not willing to undertake this, bidders will state the quantity they will undertake to furnish, and the times within which they will deliver them.

8. The delivery of bricks must commence within twenty days after the signature of the contract, and continue in such times and such quantities as the engineer may from time to time require, in conformity to these specifications and proposals.

9. The subscriber offers to contract for furnishing for the Washington aqueduct ten to twelve millions of bricks, at the prices hereinafter stated, and in the times and quantities of the following table, and to complete the delivery of said bricks in conformity to the terms of the preceding specifications, and upon the terms and conditions of the contract which he may hereafter subscribe, in the form a copy of which has been shown to and read by him, viz:

For Bricks, per thousand, delivered, on boats to be furnished by the United States, at the brick yard landing on the Chesapeake and Ohio canal, \$8 25.

400,000	to be delivered by 21st of June.....	1857.
600,000	more " " July.....	1857.
800,000	" " August .....	1857.
800,000	" " September ....	1857.
800,000	" " October.....	1857.
800,000	" " November.....	1857.
800,000	" " December.....	1857.

Total, 5,000,000 to be delivered by 21st of December..... 1857.

And any quantity, not exceeding seven millions, that may be required in the year 1858, at the rate of one million per month, commencing with the first million on the first day of May, 1858, in the same manner and at the same price, viz: eight dollars and twenty-five cents per thousand: *Provided*, That notice of the quantity needed in the year 1858 be given me on or before the first day of January, 1858.

I also offer, instead of delivering them, upon boats to be furnished by the United States, at the brick yard landing, to deliver such of the bricks as may be required at such points on the berme bank of the Chesapeake and Ohio canal as may be designated by the engineer, at the rate of eight dollars and eighty-seven cents per thousand.



## WASHINGTON AQUEDUCT.

*Contract for sand.*

1. Agreement between George W. Jackson, of Washington city, District of Columbia, of the first part, and Captain M. C. Meigs, of the corps of United States engineers, of the second part, acting for and in behalf of the United States of America, as engineer in charge of the Washington aqueduct, witnesseth :

2. That the party of the first part, for and in consideration of the matters hereinafter referred to and set out, covenants and agrees with the party of the second part to furnish and deliver, at the proper cost of the said party of the first part, upon the berme bank of the Chesapeake and Ohio canal, at such points as may from time to time be designated by the party of the second part, from 100,000 to 300,000 bushels of good, clean, sharp, silicious sand, as described and referred to in the printed specifications and proposals, a copy of which is annexed to and is to be deemed and taken as a part of this contract, and to do the same in conformity to said specifications and proposals, and to the directions he may from time to time receive from the engineer.

3. And the party of the second part, for and in consideration of the premises, covenants and agrees to pay to the party of the first part, for all sand which shall have been delivered by the said party of the first part, under and in conformity with the terms of this contract and proposal, and which shall have been inspected and accepted by the said party of the second part, at the rates per bushel specified in the said proposal and specifications hereto attached.

4. Provided, nevertheless, that in case the party of the second part shall at any time be of opinion that this contract is not duly complied with by the party of the first part, or that it is not in due progress of execution, or that the party of the first part is irregular or negligent, in such case he shall be authorized to declare this contract forfeited, and thereupon the same shall become null and void, and the United States shall thereupon be exonerated from every obligation thence arising ; and the reserved per centage on the contract price, as well as all the materials furnished upon which no estimate or payment may have been made, shall be forfeited to and become the right and property of the United States ; and the party of the second part may thereafter agree with any other person for the execution of the remainder of the work ; and the party of the first part shall have no appeal from the opinion and decision aforesaid, and he hereby releases all right to except to or question the same in any place or under any circumstances whatever, but the party of the first part shall still remain liable to the party of the second part for the damages occasioned to him by the said failure or refusal ; and it is further agreed between the parties, that, in order to secure the punctual performance of the covenants above made by the party of the first part, and to indemnify and protect the party of the second part from loss in case of default and forfeiture of this contract, the said party of the second part shall be authorized to retain in his hands, until the completion of the contract, *ten per cent.* on the amount of moneys at any time due to the said party of the first part.



5. It is further agreed that, in case of the death, resignation, removal or absence of any engineer, the United States, by its proper officers, may depute any other engineer to act in his place.

6. The United States reserves the right to suspend the work under this contract at any time; and when the work has been faithfully performed by the contractor, he will be paid in full for all work done up to the time of such suspension.

7. And it is further stipulated and agreed that no member of Congress shall be admitted to any share or part in this contract or agreement, or to any benefits to arise therefrom; and this contract shall be in all its parts subject to the terms and conditions of an act of Congress, passed on the twenty-first day of April, in the year of our Lord one thousand eight hundred and eight, entitled "An act concerning public contracts.

And this contract is also expressly understood to be subject to the terms and conditions of the joint resolution of Congress approved April 14, 1852, containing a proviso in the following terms, to wit: "Provided, Nothing herein contained shall be so construed as to authorize any officer of the United States to bind the United States by contract beyond the amount appropriated by Congress, or to sanction any such contract heretofore made;" *Provided, also*, That it is expressly understood and agreed that this contract, nor any part thereof, shall not be sub-let nor assigned; but that it shall be well and truly carried out and fulfilled in good faith by the above recited party of the first part, and that all payments on account thereof shall be made to the aforesaid party of the first part, his heirs, executors or administrators.

8. And for the true and faithful performance of all and singular the covenants, articles and agreements hereinbefore particularly set forth, the subscribers hereunto bind themselves, jointly and severally, their and each of their successors, heirs, executors and administrators.

9. Thus covenanted and agreed by the said parties this second day of June, in the year of our Lord one thousand eight hundred and fifty-seven, (1857,) as witness their hands and seals.

(Done in quadruplicate.)

G. W. JACKSON. [SEAL.]

M. C. MEIGS, [SEAL.]

*Capt. Eng's, in charge of Washington Aqueduct.*

Witnesses to signature of Capt. M. C. Meigs:

N. A. BOSS.

W. G. MOORE.

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#### WASHINGTON AQUEDUCT.

##### *Specifications for sand.*

1. Proposals will be received for furnishing sand for the Washington aqueduct.

2. None but good, clean, sharp, flint or silicious sand will be received.

3. It must be delivered into bins which will be prepared to receive it on the berme bank of the Chesapeake and Ohio canal, adjacent to the line of the Washington aqueduct; and it will be measured in these bins.

4. Proposals will state the quantity which the bidder will undertake to deliver during this season, stating the rate of delivery per month, and the greatest and the least quantity for which he will contract.

5. The proposals may be for any quantity not exceeding three hundred and fifty thousand bushels.

6. The engineer will designate the particular bin into which any load of sand is to be delivered.

*Proposal.*

The subscriber offers to contract for furnishing for the Washington aqueduct from one hundred thousand to three hundred thousand bushels of sand, at the price hereinafter stated, and in the times and quantities of the following table, and to complete the delivery of the said sand in conformity to the terms of the preceding specifications, and upon the terms and conditions of the contract which he may hereafter subscribe, in the form a copy of which has been shown to and read by him:

For sand, per bushel, 6 cents, as required, up to December 1, 1857. —, 000 to be delivered by 1st June, 1857; —, 000 by July, 1857; —, 000 by August, 1857; —, 000 by September, 1857; —, 000 by October, 1857; —, 000 by November, 1857; —, 000 by December, 1857; —, 000 by January, 1858; —, 000 by March, 1858; —, 000 by April, 1858; —, 000 by May, 1858; —, 000 by June, 1858.

Signed by me, this 5th day of May, in the year of our Lord 1857.

G. W. JACKSON.

*To Captain M. C. Meigs, U. S. Engineers:*

We, the undersigned, residents of Washington city, in the District of Columbia, hereby, jointly and severally, covenant with the United States, and guaranty, in case the foregoing bid of G. W. Jackson be accepted, that he or they will, within ten days after the acceptance of the said bid, execute a contract for the same, with good and sufficient sureties, and perform the work in conformity to the terms of the advertisement and specifications under which it was made. And in case the said G. W. Jackson shall fail to enter into contract as aforesaid, we guaranty to make good the difference between the offer by the said and the next lowest bidders.

J. T. WALKER,  
J. S. LENMAN.

I hereby certify that, to the best of my knowledge and belief, the above named guarantors are good and sufficient.

JOHN S. HOLLINGSHEAD,  
*Notary Public and Justice of the Peace.*

WASHINGTON AQUEDUCT.

*Contract for sand.*

1. Agreement between Richard F. Jackson, of Washington city, District of Columbia, of the first part, and Captain M. C. Meigs, of

the corps of United States engineers, of the second part, acting for and in behalf of the United States of America, as engineer in charge of the Washington aqueduct, witnesseth :

2. That the party of the first part, for and in consideration of the matters hereinafter referred to and set out, covenants and agrees with the party of the second part to furnish and deliver, at the proper cost of the said party of the first part, upon the berme bank of the Chesapeake and Ohio canal, at such points as may from time to time be designated by the party of the second part, one hundred and forty-four thousand bushels of good, clean, sharp, silicious sand, as described and referred to in the printed specifications and proposals, a copy of which is annexed to and is to be deemed and taken as a part of this contract, and to do the same in conformity to said specifications and proposal, and to the directions he may from time to time receive from the engineer.

3. And the party of the second part, for and in consideration of the promises, covenants and agrees to pay to the party of the first part, for all sand which shall have been delivered by the said party of the first part, under and in conformity with the terms of this contract and proposal, and which shall have been inspected and accepted by the said party of the second part, at the rates per bushel specified in the said proposal and specifications hereto attached.

4. Provided, nevertheless, that in case the party of the second part shall at any time be of opinion that this contract is not duly complied with by the party of the first part, or that it is not in due progress of execution, or that the party of the first part is irregular or negligent, in such case he shall be authorized to declare this contract forfeited, and thereupon the same shall become null and void, and the United States shall thereupon be exonerated from every obligation thence arising ; and the reserved per centage on the contract price, as well as all the materials furnished upon which no estimate or payment may have been made, shall be forfeited to and become the right and property of the United States ; and the party of the second part may thereafter agree with any other person for the execution of the remainder of the work ; and the party of the first part shall have no appeal from the opinion and decision aforesaid, and he hereby releases all right to except to or question the same in any place or under any circumstances whatever, but the party of the first part shall still remain liable to the party of the second part for the damages occasioned to him by the said failure or refusal ; and it is further agreed between the parties that, in order to secure the punctual performance of the covenants above made by the party of the first part, and to indemnify and protect the party of the second part from loss in case of default and forfeiture of this contract, the said party of the second part shall be authorized to retain in his hands, until the completion of the contract, *ten per cent.* on the amount of moneys at any time due to the said party of the first part.

5. It is further agreed that, in case of the death, resignation, removal, or absence of any engineer, the United States, by its proper officers, may depute any other engineer to act in his place.

6. The United States reserves the right to suspend the work under

this contract at any time ; and when the work has been faithfully performed by the contractor, he will be paid in full for all work done up to the time of such suspension.

7. And it is further stipulated and agreed that no member of Congress shall be admitted to any share or part in this contract or agreement, or to any benefits to arise therefrom ; and this contract shall be in all its parts subject to the terms and conditions of an act of Congress, passed on the twenty-first day of April, in the year of our Lord one thousand eight hundred and eight, entitled " An act concerning public contracts."

And this contract is also expressly understood to be subject to the terms and conditions of the joint resolution of Congress approved April 14, 1852, containing a proviso in the following terms, to wit : " *Provided*, Nothing herein contained shall be so construed as to authorize any officer of the United States to bind the United States by contract beyond the amount appropriated by Congress, or to sanction any such contract heretofore made ;" *Provided, also*, that it is expressly understood and agreed that this contract, nor any part thereof, shall not be sub-let nor assigned ; but that it shall be well and truly carried out and fulfilled in good faith by the above recited party of the first part, and that all payments on account thereof shall be made to the aforesaid party of the first part, his heirs, executors, or administrators.

8. And for the true and faithful performance of all and singular the covenants, articles, and agreements hereinbefore particularly set forth, the subscribers hereunto bind themselves, jointly and severally, their and each of their successors, heirs, executors, and administrators.

9. Thus covenanted and agreed by the said parties this 26th day of May, in the year of our Lord one thousand eight hundred and fifty-seven, (1857,) as witness their hands and seals.

(Done in quadruplicate.)

RICHARD F. JACKSON. [SEAL.]  
M. C. MEIGS, [SEAL.]  
*Captain Engineers.*

Witnesses :

Z. W. DENHAM,  
(to signature of R. F. Jackson.)  
WM. G. MOORE,  
(to signature of Captain M. C. Meigs.)

# WASHINGTON AQUEDUCT.

## *Specifications for sand.*

1. Proposals will be received for furnishing sand for the Washington aqueduct.
2. None but good, clean, sharp, flint or silicious sand will be received.
3. It must be delivered into bins which will be prepared to receive

it on the berme bank of the Chesapeake and Ohio canal, adjacent to the line of the Washington aqueduct; and it will be measured in these bins.

4. Proposals will state the quantity which the bidder will undertake to deliver during this season, stating the rate of delivery per month, and the greatest and least quantity for which he will contract.

5. The proposals may be for any quantity not exceeding three hundred and fifty thousand bushels.

6. The engineer will designate the particular bin into which any load of sand is to be delivered.

### *Proposal.*

The subscriber offers to contract for furnishing for the Washington aqueduct from one hundred thousand to one hundred and forty-four thousand bushels of sand, at the price hereinafter stated, and in the times and quantities of the following table, and to complete the delivery of the said sand in conformity to the terms of the preceding specifications, and upon the terms and conditions of the contract which he may hereafter subscribe, in the form a copy of which has been shown to and read by him:

For sand, per bushel, 6 cents.—12,000 bushels to be delivered by 1st June, 1857; 12,000 by July, 1857; 12,000 by August, 1857; 12,000 by September, 1857; 12,000 by October, 1857; 12,000 by November, 1857; 12,000 by December, 1857; 12,000 by January, 1858; 12,000 by March, 1858; 12,000 by April, 1858; 12,000 by May, 1858; 12,000 by June, 1858.

Signed by me, this 7th day of May, in the year of our Lord 1857.

RICHARD F. JACKSON.

*To Captain M. C. Meigs, U. S. Engineers:*

We, the undersigned, residents of Montgomery county, in the State of Maryland, hereby, jointly and severally, covenant with the United States, and guaranty, in case the foregoing bid of six cents per bushel for the delivery of sand, &c., be accepted, that he or they will, within ten days after the acceptance of the said bid, execute a contract for the same, with good and sufficient sureties, to perform the work in conformity to the terms of the advertisement and specifications under which it was made. And in case the said Richard F. Jackson shall fail to enter into contract as aforesaid, we guarantee to make good the difference between the offer by the said Richard F. Jackson and the next lowest bidders.

ROBERT G. DAVIDSON.

PHILIP STONE.

I hereby certify that, to the best of my knowledge and belief, the above-named guarantors are good and sufficient.

J. BREWER.

## No. 11.

## REPORT OF THE CHIEF TOPOGRAPHICAL ENGINEER.

## BUREAU OF TOPOGRAPHICAL ENGINEERS;

*Washington, November 23, 1857.*

SIR: I have the honor to submit a report of the operations of this bureau since the last annual report of November 22, 1856.

The stations and duties of the officers of the corps have been as follows:

Lieutenant Colonel Kearney, who has been stationed at Detroit in charge of the survey of the northern and northwestern lakes, was in the month of July last assigned to the duty of collecting required materials for a chart of Lake Ontario, a matter of great importance to the commerce of the lakes. His report is hereto appended, marked A.

Brevet Lieutenant Colonel Long, stationed at Louisville, in charge of western river improvements, was assigned in December last to the charge of the improvements mouth of the Mississippi river and Red river. His report is hereto appended, marked B.

Major Bache has been stationed at San Francisco, California, in charge of the construction of light-houses on the Pacific coast, and superintending the construction of military roads in Oregon and Washington Territories.

Brevet Lieutenant Colonel Graham, stationed at Chicago, is in charge of harbor improvements on Lake Michigan, and since December last in charge of harbor improvements on the northern and northwestern lakes. His report has not been received, which obliges me, for details on these works, to refer to the previous reports from Brevet Colonel Turnbull, from Brevet Lieutenant Colonel Graham, and from Captain Stansbury.

Brevet Colonel Turnbull remained at Oswego, superintending works on Lakes Champlain and Ontario, and part of Lake Erie, until December last, when he was assigned to works on the coast of North Carolina, and to construction of light-houses on the same coast. His report, marked D, is hereto annexed.

Captain Campbell Graham, assigned as assistant to Major Bache, in California, is yet sick, as reported in the last annual report.

Captain Cram has been stationed since May last at the headquarters, department of the east, under the command of General Wool, in the preparation of the reports of the operations in the department of the Pacific.

Captain Stansbury, on sick leave, at Cleveland, Ohio, under orders for department of Texas.

Captain Humphreys, stationed at Washington, on duties connected with Pacific railroad surveys, member of the Light-house Board, and preparing his report upon the survey of the delta of the Mississippi.

Captain Macomb, stationed at Santa Fé, New Mexico, on duty at headquarters, department of New Mexico, and has the direction of the duties of construction of military roads in that Territory.

Captain Simpson, on duty of the Coast Survey, under the Treasury Department.



Captain Sitgreaves, assigned to duty under the Treasury Department, is in charge of the construction of light-houses on Chesapeake bay.

\*Captain Woodruff is on duty at Washington as assistant to the bureau of topographical engineers, and in charge of the survey of the Georgetown channel of the Potomac river. His report is not yet completed.

Captain Palmer, assigned to duty under orders of commanding general, department of Texas, has presented certificate of disability.

Captain Thom, stationed at St. Paul, Minnesota, is in charge of the construction of military roads in that Territory.

Captain Whipple, stationed at Detroit, Michigan, is in charge of the improvements of the St. Clair flats and flats of Lake George, St. Mary's river, and of construction of a light-house and of a beacon-light on St. Clair flats, and of light-houses on Lakes Ontario and Erie. His report is hereto appended, marked F.

Captain Meade, stationed at Detroit, Michigan, is in charge of the survey of the northern and northwestern lakes. His report, marked G, is hereto appended.

Captain M. L. Smith, stationed at Washington, is on duty under the Treasury Department as assistant to Professor Bache, and in charge of the office of the Coast Survey.

Captain Pope is on duty in northern Texas, connected with the sinking of artesian wells.

Captain Abert, with the troops in Florida.

Captain Franklin, stationed at Washington, is on duty, under the direction of the Treasury Department, as engineer secretary of the Light-house Board.

Captain Reynolds, stationed at Philadelphia, is on duty of construction of light-houses on the Florida reefs and in Delaware bay, under the direction of the Light-house Board. He is also subject to the orders of this bureau.

First Lieutenant W. F. Smith, stationed at Detroit, is on duty of construction of light-houses on Lakes Superior, Michigan, and Huron, under the direction of the Light-house Board.

First Lieutenant Bryan is in charge of military roads in Kansas. His report, marked H, is hereto appended.

First Lieutenant Derby is on duty of construction of light-houses on the coast of the Gulf of Mexico, under the direction of the Light-house Board.

First Lieutenant Williamson is on sick leave.

First Lieutenant Michler is on duty connected with the survey of a ship canal in the Isthmus of Darien.

First Lieutenant Parke is on duty, under the orders of the State Department, as astronomer to the northwest boundary.

First Lieutenant Warren, in charge of explorations and surveys in Nebraska Territory.

First Lieutenant Mendell is under the direction of Major Bache, in charge of construction of military roads in Oregon and Washington Territories. His report, marked I, is hereto appended.



First Lieutenant Ives is in charge of the exploration and survey of the Rio Colorado of the West.

First Lieutenant Abbott, stationed at Washington, is on duty connected with Pacific railroad survey.

Second Lieutenant Turnbull is on survey of the northern and northwestern lakes, under Captain Meade.

Second Lieutenant Wheeler is on duty at the headquarters of the military department of the Pacific.

Second Lieutenant Poe is on survey of northern and northwestern lakes, under Captain Meade.

Brevet Second Lieutenant Joseph L. K. Smith, assigned as a graduate cadet to the corps in July, is on leave of absence, granted by law to graduates of the Military Academy.

Brevet Second Lieutenant Putnam, assigned as a graduate cadet to the corps in July, has been recently on duty under Captain Crane by order of the colonel of topographical engineers.

Brevet Second Lieutenant W. P. Smith, assigned as a graduate cadet to the corps in July, is on leave of absence, granted by law to graduates of the Military Academy. His orders are to report to Captain Meade.

It is not considered necessary to repeat in this report the general remarks in previous annual reports, but special attention is called to recommendations therein for enlarged appropriations for explorations and surveys of the vast country between the Mississippi and the Pacific coast; for the survey of the lakes, and for military roads; for an increase of the corps; for the repairs and preservation of the steam dredges on the lakes, and to an appropriation for the payment of arrearages.

The appropriation in this last case would be for \$25,000, and guarded with a proviso to settle claims by Third Auditor, approved by War Department.

The extreme delay which takes place in the printing of maps obliges me to bring the matter to your notice, and respectfully to suggest that maps furnished by a bureau of the War Department be printed under the direction of that bureau.

The reports of officers go much into detail in the several works in hand, exhibiting their progress and present condition, with estimates for continuation and completion; from which the following summary of operations is made out:

#### LAKE SURVEYS.

The office work during the winter and spring comprised the making of computations and projecting from the field notes, by the several parties, the detailed sheets of their work, of which eight sheets were to a scale of  $\frac{1}{16000}$ ; one sheet was to a scale of  $\frac{1}{10000}$ ; one sheet was to a scale of  $\frac{1}{82000}$ ; and one sheet was to a scale of  $\frac{1}{128000}$ .

In addition to the computation of the astronomical observations at the Charity islands, observations for the latitude and the longitude were made at Detroit.

The field observations of the present season have been conducted un-

der the following organization of parties, namely: one primary triangulation and off-shore hydrography party; one astronomical and magnetic party; and three shore-line topography and hydrography parties.

One of the steamers has been in commission the entire season; the other steamer a portion of the season only.

The astronomical party has observed up to date of report twenty-one transits of moon, and moon-culminating stars, for the longitude, and two hundred and sixty-five pairs of stars with the zenith instrument, for the longitude of the observatory at Sand Point, Saginaw bay.

The shore-line topography and hydrography parties have been engaged upon the delineation of the shores of the main land and of the Sibonin islands, Saginaw bay, to the four-fathom curve.

These parties have already completed over two hundred square miles of topography and minute hydrography. Captain Meade adds: "At the close of the present season of field work, it is expected that the base line will be measured; the main triangulation extended from it to cover all of the bay above the Charity islands; that the latitude and longitude of one of the points of triangulation will be accurately determined by observation, and the azimuths of one or more of the lines of triangulation; that the topography and hydrography of the whole of the shore-line of the bay, both above and below the Charity islands, will be completed; finally, the hydrography of the bay, above these islands, not included in the shore-line work, will be finished.

"In other words, the data obtained for the final projection of the chart of this extensive and important bay, above the islands, comprising a space of over nine hundred square miles of work executed."

One of the shore-line parties was detached from the organization in order to erect marks on the boundaries of the public lands at Mackinac island, the surveys at which had been made the previous season. This party was subsequently employed in revising a portion of the survey of Lake George, St. Mary's river.

During the past year five charts (one final and four preliminary) have been transmitted to the engraver, and considerable progress has been made in the preparation of additional charts.

An increase of the means in the department of drawing is seriously needed. Data for the charts of St. Mary's river, and three harbors on Lake Superior, are now in the office, and long before they can be prepared for engraving the data will be obtained for the chart of Saginaw bay.

The data is thus constantly accumulating, and a delay in the publication of the results of the survey necessarily occurs for want of adequate means to prepare them.

The list of charts published up to date comprises six final charts, and three preliminary charts; two final charts and one preliminary chart are now in the hands of the engraver; and four final charts are being prepared and nearly ready for engraving.

The importance of the lake surveys demands more liberal appropriations than have hitherto been made, that its beneficial results may be more rapidly extended.

"The survey of the lakes has for its object the delineation of the

shores and bottom of the great northern and northwestern lakes; the bringing to light all hidden dangers to navigation; the furnishing the evidence of the capacity and depth of water in all the harbors and rivers, and consequently the most practicable mode of improving them; the furnishing the evidence of the wants of navigation, in reference to light-houses, beacons, and buoys, and the proper sites for the same."

"This cursory glance at the objects of the survey sets forth the field of usefulness that is covered by it, and the numerous and extensive interests it embraces."

#### DEEPENING CHANNEL OVER ST. CLAIR FLATS.

"For this operation a contract with Theodore D. Barton, of Buffalo, to excavate at 30 cents per cubic yard, was approved by the Secretary of War June 22, 1857. Operations were commenced on the first of July following. They were interrupted by much stormy weather.

"The total amount excavated in the month of July was 14,159 cubic yards, 1,158.5 being the greatest number of yards dredged in one day.

"In August the excavation amounted to 9,261 cubic yards, 13,670.9 having been the greatest day's work. The material removed consists of coarse sand, fine sand, and an occasional mixture of clay or mud. A cut, between forty and forty-five feet in width and about fourteen feet in depth, has been excavated entirely through from the river channel to the deep water of the lake.

"This has caused an increase in the velocity of the current threading the cut. It is desired to complete this channel during the summer of 1858, and the contractor promises to put on the work sufficient machinery to accomplish it. For this purpose an additional appropriation of \$23,421 will be required."

#### CONSTRUCTION OF FOUNDATIONS FOR A LIGHT-HOUSE AND A BEACON LIGHT ON ST. CLAIR FLATS.

"The plans for these structures have not been approved, and no expenditures will probably be made until the strata, upon which the foundations should rest, have been examined."

#### FOR DEEPENING THE CHANNEL OF ST. MARY'S RIVER.

"A contract for this improvement was entered into with Barton and Osgood, and approved by the Secretary of War April 24, 1857.

"The prices for excavations were—

"1. For all earth, such as sand, gravel, stone, or clay, not cemented, the sum of 37 cents per cubic yard.

"2. For hard pan, or cemented sand and clay, \$1 50 per cubic yard.

"3. For rock measuring above one-half cubic yard, \$10 per cubic yard.

"Dredging was commenced July 14; the material excavated proved to be partly fine clay, occasionally mixed with sand; partly sand without clay, and in some places so hard as to be dredged with con-

siderable difficulty. In July the excavated material amounted to 7,226.44 cubic yards; the greatest amount in any one day being 1,036.24 cubic yards.

"In August the best day's work was 1,328.85 cubic yards, and the total removed 13,435.75. The United States sub-agent reports that there remains to be excavated from the extreme west channel about 480,000 cubic yards; of this there are about 40,000 cubic yards of hard material, for which the contractors will claim a greater price than for the rest. But at 37 cents per cubic yard, an estimate for the completion of the improvement of this channel would be as follows, viz :

480,000 cubic yards of excavation, at 37 cents.....	\$177,600 00
Improvement of East Neebish rapids, (as per Captain Macomb's estimate).....	9,440 00
Ten per cent. for superintendence and contingencies....	18,704 00
Total .....	205,744 00
Amount on hand .....	90,282 47
Additional appropriation required.....	115,461 53

#### REOPENING A COMMUNICATION BETWEEN ALBEMARLE SOUND AND THE ATLANTIC OCEAN.

The engineer officer in charge of the work reported against the practicability of the scheme, and recommended its abandonment, which was approved by the War Department. The engineer reports :

"The products of eastern North Carolina mostly find a market through the Dismal Swamp canal, which is too limited in its capacity; but the Albemarle and Chesapeake Canal Company are now engaged in excavating a canal of larger dimensions, connecting Chesapeake bay with Currituck, Albemarle and Chesapeake and Pamlico sounds, and their tributary streams, which they anticipate completing within the next year, and, when accomplished, will obviate all necessity of a communication with the sea through Nag's Head."

#### IMPROVEMENT OF CAPE FEAR RIVER.

"The works for the improvement were suggested and recommended by a commission, at the head of which was Professor Bache, of the Coast Survey. They first proposed 'the protection of Bald Head from further abrasion by jetties, like those at Fort Caswell.'

"2d, is the filling up of the two small openings near New Inlet, about four hundred yards over, and four feet deep in the middle at low water; the other, about two hundred yards over, and two feet deep at low water."

This portion of the work has been accomplished. It was commenced under the direction of Lieutenant Woodbury. \* \* \*

The work was completed under the direction of Lieutenant Whiting, of the corps of engineers.

"3d. A jetty from Zeke's island to prevent New Inlet from making south.

"4th. Closing up New Inlet."

The engineer officer in charge recommends "that New Inlet should be kept open; its bar is equally good as the western bar, and is far more accessible in certain winds than the eastern bar.

"In the event of New Inlet being preserved, it would be necessary to fortify it, which could be done at a far less expense than stopping it."

The engineer recommends "an appropriation of \$25,000 to maintain and extend the works between Zeke's island and Smith's islands."

#### WESTERN RIVER IMPROVEMENTS.

The works in progress during the year embraced the improvement of the harbor of Dubuque, of the Rapids of the Mississippi, of Red river at and near the Raft, and of the Ohio river.

#### HARBOR OF DUBUQUE.

The proceedings in reference to this improvement were limited to contracting with the Dubuque Harbor Company to the extent of the unexpended balance of the appropriation (\$1,000) for the prosecution of the improvements.

#### RAPIDS OF THE MISSISSIPPI.

Lieutenant Colonel Long remained in charge of the improvements until relieved by Captain Palmer in December last. Captain Palmer was relieved by Agent Floyd in May last. The improvements have been continued under the contracts of May, 1855.

Two distinct series of waterfalls in the Upper Mississippi are comprised under this head, with a navigable reach of about one hundred and thirty miles connecting them.

The lower series is called Des Moines rapids, and has an extent of about eleven miles; the upper series is called Rock island rapids, and has an extent of about fourteen miles.

The work of improvement of both rapids was put under contract in 1854. The contract was abandoned by the contractors by reason of the inadequacy of the contract price.

A new contract was effected in 1835, under which the work progressed the last season; the contractor, however, failed to remove as large an amount of rock per month as was required by contract, owing, as is alleged, by the contractors, to cold rains and to rise of water.

During the present season Agent Floyd has been in charge of the improvements. He reports that the work was resumed under the existing contract, but the season has proved unusually backward. "The river has not subsided to low water this season, remaining constantly a foot, or more, higher than the last season, and is now rising, with no probability of low water."

## DES MOINES RAPIDS OF THE MISSISSIPPI RIVER.

It was proposed to continue the improvement under the appropriation of August 16, 1856, by contract. Bids were accordingly solicited. The prices, per cubic yard of rock to be removed, varied from \$5 80 to \$12 50. The War Department declined the acceptance of any of the bids offered, and directed that the agent be instructed to prosecute the work by hired labor.

The agent has procured machinery that will work at any stage of water upon the rapids, and at all seasons, except when the river is closed by ice. His report marked K is hereto appended.

## ILLINOIS RIVER.

The craft and other apparatus belonging to this improvement have been sold.

## OHIO RIVER.

Two successful efforts have been made during the past year for the improvement of this river; one the removal of the wreck of a steamer from the Point of Rocks below the mouth of the Louisville and Portland canal; the other consisted in the blasting and removal of rocks from the Indiana chute of the falls.

## MISSISSIPPI, MISSOURI, AND ARKANSAS RIVERS.

Nothing has been done by the United States towards the improvement of these rivers during the last fiscal year, except so far as relates to the improvement of Des Moines rapids, and of the mouths of the Mississippi.

## RAFT OF RED RIVER.

The work of improvement has been much embarrassed by the insalubrity of the raft district, the difficulty of procuring and retaining laborers, the scarcity and consequent high prices of provisions and labor, and the sickness and desertion of laborers. Agent Fuller in his annual report to Lieutenant Colonel Long, remarks: "The present state of the work is briefly as follows: upwards of three miles of old raft having been removed from Red river and stowed in Dooley's bayou and the small lakes, the route is open, although not completed, from Shreeveport to Coshatta bluff, on Red river, and might be navigated to the upper river were the mile of new raft removed. A cut has been partially made into Dutch John's lake, above the head of this new raft, both for the purpose of stowing raft and avoiding that portion of the river at which this new raft has lodged.

An outlet into the river above Coshatta, and another below this raft, will not only allow the river to pass through the lake, but will give a receptacle for the stowage of several years' run of timber.



The route through Dooley's bayou, the lakes, and Twelve Mile bayou to Shreeveport, although susceptible of navigation, requires much labor to render it safe. A portion thereof, where it crosses Shift Tail lake, and the pass into the head of Soda lake, will need some dredging."

The expenses during the fiscal year ending June 30, 1857, were \$24,445 82.

The balance remaining unexpended at the same date was \$13,040 13.

A further appropriation will be required for the completion of this improvement.

#### REMOVAL OF OBSTRUCTIONS FROM THE MOUTHS OF THE MISSISSIPPI.

The work of improvement consists in the removal of obstructions from the Southwest Pass and the removal of obstructions from the Pas à l'Outre, each of which is to be carried into effect by special contract, which required the opening of both passes of a channel 300 feet wide and 20 feet deep across the tidal bar, in a period of ten months from the date of the contract, to wit: on the 15th September, 1857.

The method of improvement proposed by the contractors contemplated the formation of jettys or lines of piles on both sides of each channel through greater or less distances converging towards each other as they approached the tidal bar. Similar works were to be erected across the outlets of both passes above the convergent lines of piles above mentioned, for the purpose of preventing overflows and compelling them to pass between the jettys.

The contractors have confined their work to the Southwest Pass. No work has been as yet commenced at Pas à l'Outre.

On the 30th of June last the line of piles on the left or southeasterly side of the Southwest Pass had an extent of about 3,200 feet.

Nothing had been done towards the formation of a counter line of piles on the other side of the Pass, or to the blocking up of outlets on either side of the Pass.

The progress of the work has been retarded by unfavorable weather, and large portions of the work have been deranged by storms.

It does not appear that any changes of moment have been produced in the Pass by the operations of the contractors up to the 30th of June last.

#### MILITARY ROADS IN MINNESOTA TERRITORY.

The several works for which appropriations have been made are as follows, viz:

1. Road from Point Douglas to the mouth of St. Louis river.
2. Road from Point Douglas to Fort Ripley.
3. Road from Mendota to Wabashaw.
4. Road from Mendota to the mouth of Big Sioux river.
5. Road from the Falls of St. Anthony to Fort Ridgely.
6. Road from Fort Ripley, *via* Crow Wing river, to intersect the main road leading to the Red River of the North.
7. Road from Swan river to Long prairie.



## ROAD FROM POINT DOUGLAS TO THE MOUTH OF ST. LOUIS RIVER.

Portions of this road, between the 163d mile station and Superior, have been constructed since the last appropriation by Congress became available, including bridges of 56 feet span over Pokegama river, besides culverts, side ditches, and other work most required on that section of the road.

This road, connecting by the shortest route the head of navigation of the Mississippi river with Lake Superior—a distance of about 181 miles—will be completed, it is hoped, the coming season, though additional means will be required to render it practicable at all seasons of the year.

The completion of this road is eminently important both to Minnesota and Wisconsin.

## ROAD FROM POINT DOUGLAS TO FORT RIPLEY.

This road extends from Point Douglas, up the valley of the Mississippi river 144½ miles, to Fort Ripley.

The unfinished portion of the road between Point Douglas and St. Paul, in extent twelve miles, will probably be completed before the close of the present season. The bridge over Rum river at Amoka will soon be repaired, and the road in other places, where required, will soon be constructed. The existing appropriation is adequate for its completion.

## ROAD FROM MENDOTA TO WABASHAW.

This road extends from Mendota, opposite Fort Snelling, to Wabashaw, a distance of seventy-six miles. In the last annual report this road was reported as completed, with the exception of the repairs of the bridge over Cannon river. The commissioners of Goodhue county have contracted to finish the bridge by the 1st November next for the amount appropriated by the last Congress, \$2,000, a sum much below that estimated.

## ROAD FROM MENDOTA TO THE MOUTH OF THE BIG SIOUX RIVER.

This road extends from Mendota, opposite Fort Snelling, south-westwardly through Minnesota and Iowa, to the mouth of the Big Sioux river, a distance of 279 miles, as originally located.

With the exception of some corduroying, 178 miles of the road have been completed. There remain to be constructed 178 miles, for which the engineer officer estimates \$36,000.

## ROAD FROM THE FALLS OF ST. ANTHONY TO FORT RIDGELY.

This road extends from Minneapolis, at the Falls of St. Anthony, via Carver and Henderson, to Fort Ridgely, a distance of 95 miles.

Contracts have been made for cutting out the timber on the route, and to be completed on or before the 30th of November next.

No further appropriation will be required to effect the object indicated in the law making the appropriation: "For cutting out the timber on the territorial road from the Falls of St. Anthony to Fort Ridgely, five thousand dollars."

ROAD FROM FORT RIPLEY, VIA CROW WING RIVER, TO THE MAIN ROAD LEADING TO THE RED RIVER OF THE NORTH.

This road is now being surveyed and located as expeditiously as the difficulties attending it will allow. Its length will be about 160 miles. It connects the Upper Mississippi with the navigable waters of the Red River of the North.

Captain Thom reports: "It will be indispensably necessary for the transportation of troops and supplies to the new military post to be established on that river under the appropriation made by Congress at its last session."

An additional appropriation will be required to complete the road—say about \$25,000.

ROAD FROM SWAN RIVER TO LONG PRAIRIE.

This road extends from the Mississippi river, near the mouth of Swan river, to the old Winnebago agency at Long prairie, a distance of 28 miles. It is entirely completed.

ROADS IN KANSAS AND NEBRASKA.

*Road from Fort Riley to Bridger's Pass, in the Rocky Mountains, Kansas Territory.*

The survey of this road was completed last season, and a practicable route located. During the present season the engineer officer has been engaged in improving the route, working such portions as most required it in the reduction of grades, &c. His report has not been received, as he has but recently returned from the distant point of his labors.

*Road from a point on the Mississippi river, opposite the city of Council Bluffs, in the Territory of Nebraska, to New Fort Kearney.*

During the present season the bridges over the Omaha creek, Big Papillon creek, Little Papillon creek, Rawhide creek, and Shell creek have been completed, and the bridge over the Elkhorn river will be completed this fall by contract.

Besides the above, a bridge over Monroe creek and one over Prairie creek, by hired labor. The working of some portions of the road remains to be done this fall, when, with the exception of the crossing of the Loup fork, a good wagon road for the dry season of the year will exist; but many portions of it will be impassable during the freshets that occur during the months of April, May, and June—the period that the emigration is passing over the route.

An additional appropriation is required to make a practicable road at all seasons, including the bridging of the Loup fork.

The estimate of the engineer officer is \$108,000.

See reports marked M and L, hereto appended.

#### MILITARY ROADS IN OREGON AND WASHINGTON TERRITORIES.

##### *Military road from Astoria to Salem, Oregon Territory.*

During the present season, the work has been carried on with a view to open the route throughout its whole extent, in conformity with the original instructions of the honorable Secretary of War.

About forty miles have been opened this season; at the close of the last season nearly thirteen miles had been opened; there remains to be opened about sixteen miles, for which purpose the balance of funds on hand will be adequate.

Much labor will be necessarily expended in reducing grades before the road will be practicable for wagons. Lieutenant Mendell reports:

"For long distances there is literally no level ground—the hills are generally steep, and require much grading; added to this, the whole route is densely timbered with a huge growth of fir, hemlock, &c., and in the bottoms are found very thick tangles of undergrowth."

"It is thought that \$600 per mile, for fifty miles of the line opened this season, will construct a fair road from Astoria to the Tualatin plains—in all \$30,000."

##### *Military road from Columbia barracks to Fort Steilacoom, Washington Territory.*

The portion of this route from Cowlitz plains to Fort Steilacoom will be completed this season, furnishing a good ordinary wagon road. There remains the construction of the road from Cowlitz Landing to the Columbia river at Monticello, a distance of thirty miles. Much hazard and delay are experienced on the present route from the overflow of the Cowlitz river in periods of freshets. It is thought that a route may be located that will lie above high water mark on the west bank of the Cowlitz river, and that a good road may be opened for about \$15,000.

This route is the mail route for the greater portion of the inhabitants of Washington Territory, and is also of eminent importance for military purposes in facilitating transportation of troops and supplies between Oregon Territory and Puget sound.

##### *Military road from Columbia barracks to Fort Dalles, Oregon Territory.*

This road was completed last season. During the heavy rains of the past winter much injury was sustained from land slides. The balance of funds on hand was expended in repairs.

It furnishes an excellent summer road, but a recurrence of slides is anticipated from the rains of winter. The government trains have made constant use of it since its construction.

*Road from Steilacoom to Bellingham bay, Washington Territory.*

The appropriation for this road by the last Congress was not available until the month of July. The reconnaissance of the route was commenced in August, and it is believed that the surveyor will return by the 15th of October to prepare the map and memoir.

*Roads in southern Oregon.*

Lieutenant Mendell reports : " It has not been in my power to visit the lines of operations of these roads. It is suggested that the two roads, viz : Camp Stewart to Myrtle creek, and Myrtle creek to Scottsburg, should be assigned to one officer. They are too distant from this point, and the facilities for reaching them too poor, to be under the direction of an officer whose attention is frequently requisite on roads on Puget's Sound."

*Road from the Great Falls of the Missouri river to the Territory of Nebraska, to intersect the military road now established leading from Walla-Walla to Puget's Sound.*

The appropriation for this road is \$30,000, a sum inadequate for its construction ; in fact, little more than a reconnaissance under the protection of a large government escort could be accomplished by it.

Respectfully, sir, your obedient servant,

J. J. ABERT,  
Colonel Corps Top. Eng.

Hon. JOHN B. FLOYD,  
Secretary of War.

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APPENDIX A.

WASHINGTON, November 19, 1857.

SIR : I have to report in relation to my duties of the past season as follows : On the 25th May I was relieved from the superintendence of the survey of the northern and northwestern lakes. On the 21st of July I was ordered to take charge of the survey of Lake Ontario, and have continued on that service to the present time. A visit to Lake Ontario, on that duty, during the past autumn, satisfied me that the preparations necessary for carrying on the work in the field, conformably with the system sanctioned by the department for several years with reference to the other lakes, and which alone can give value to the work, was such as to forbid the hope of prosecuting it with advantage, or of arriving at results commensurate with their cost. Upon that subject, however, I propose addressing a report to the bureau, intended to recommend the necessary preparations during the coming winter and spring.

Assuming that the small steamer "*Surveyor*," belonging to the

survey of the lakes, and now in ordinary, may be spared for this lake next year, I would advise her transferred to it, so as to avoid this very serious source of expense—the hire of vessels. The astronomical and other instruments, which might possibly be spared from the service of the upper lakes, would also relieve the appropriation for Lake Ontario very considerably. It might not be prudent, however, to calculate upon such a saving, and I would therefore assume that this special work should be charged with the cost of its own instruments. This being granted, the expenses of the survey of Lake Ontario for the coming year might be set down at some fifteen thousand dollars, which should be included in the general item of appropriation for the survey of the northern and northwestern lakes, so as to enable the department to apply any surplus, if surplus there should be, to the work of the upper lakes, after satisfying the wants of Lake Ontario.

Respectfully, sir, your obedient servant,

JAMES KEARNEY,

*Lieutenant Colonel Topographical Engineers.*

Colonel J. J. ABERT,

*Bureau Topographical Engineers.*

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## APPENDIX B.

LOUISVILLE, *September 1, 1857.*

SIR: In compliance with your instructions of the 20th of May last, I have the honor to submit my annual report of this date, and to request that it may be regarded as supplementary to my last preceding annual report, (dated September 1, 1856,) which appears never to have been published. The reasons of this request are that the report mentioned exhibits a compendious showing of the affairs and condition of my superintendency at the close of the fiscal year ending on the 30th of June, 1856, and more especially because it contemplates and provides for a series of works and operations then and still deemed appropriate and necessary to the further prosecution of western river improvements.

A brief account of the operations and disbursements which have occupied my attention during the fiscal year, beginning on the 1st of July, 1856, and ending on the 30th of June, 1857, first claims attention.

The works confided to my superintendence and remaining under my charge at the beginning of the year just designated are the following, viz: The improvement of the Mississippi, Missouri, Arkansas, and Ohio rivers; in relation to which I have served not only as superintendent but as a disbursing agent. Moreover, the improvement of Red river at and near the Raft, the improvement of the rapids of the Upper Mississippi, and the improvement of the harbor of Dubuque, were included within my superintendence merely while the disbursements on account thereof were entrusted to special agents appointed by order of the War Department. The same is true also of the im-

provement of the Illinois, which is here noticed merely on account of a small balance still remaining in the possession of its late disbursing agent, George A. Dunlap, esq.

Agreeably to an order from the War Department, dated December 11, 1856, the office of the superintendent of western rivers, then and previously under my control, was abolished, and the superintendence of the works at the rapids of the upper Mississippi and at the harbor of Dubuque was transferred to the charge of Captain W. R. Palmer. By the same order the works for the removal of obstructions from the mouths of the Mississippi, for the execution of which specific contracts had been entered into with the sanction of the War Department, were placed under my supervision. The other improvements above mentioned still remain under my charge as before, no assignments of them to the charge of others having been contemplated in the order.

With respect to the receipts and expenditures incurred on account of the works and operations above mentioned, in so far as they were brought about by my control and supervision, they are as follows :

*Receipts by Lieutenant Colonel Long in his capacity of disbursing agent.*

From the annual report first above cited it appears that the amount in my hands on the 1st July, 1856, for disbursement during the fiscal year ending on that date, was .....	\$12,586 02
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To this amount should be added sundry sums received on various accounts since that date and within the year, which are as follows :

Net proceeds from the sale of craft, &c., employed in the improvement of the Illinois river, sold on the 1st of January, 1857.....	835 00
Remittance from United States treasury on my requisition for funds on account of the improvement of the mouths of the Mississippi, made under date of February 25, 1857.....	2,000 00
Balance transferred from Major G. T. Beauregard to the undersigned on the same account, under date of April 6, 1857.....	478 30

Total amount of receipts.....	15,899 32
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*Expenditures by same as disbursing agent.*

For western river improvements at large, 3d quarter 1856	\$813 55
For western river improvements at large, 4th quarter 1856	1,015 19
For western river improvements at large, 1st quarter 1857	534 02
For western river improvements at large, 2d quarter 1857	249 33
For improvement of Ohio river, 1st quarter 1857.....	559 91
For improvement of mouth of Mississippi, 1st quarter 1857	537 20
For improvement of mouth of Mississippi, 2d quarter 1857	823 25

Total amount of expenditures for the year.....	4,532 45
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Amount in the possession of Lieutenant Colonel Long, at the end of the last fiscal year and thereafter, to be accounted for ..... \$11,366 87

The disposition made of the several sums composing this amount is as follows :

Deposited in sub-treasury at St. Louis.....	\$5,021 89
Deposited in sub-treasury at New Orleans.....	1,195 30
Deposited with self at Louisville.....	5,149 68
Total as before .....	<u>11,366 87</u>

The amount as above is derived in part from sales of public property appertaining to the improvement of the western rivers, and is composed in part of sundry unexpended balances of appropriations, and remains applicable to the following objects in the sums annexed thereto, respectively, in subjoined schedule, to wit :

Improvement of western rivers at large.....	\$4,539 66
Improvement of the Mississippi river. ....	1,092 19
Improvement of the Missouri river.....	1,574 94
Improvement of the Arkansas river.....	1,894 12
Improvement of the Ohio river, &c. ....	1,148 11
Improvement of the mouths of the Mississippi.....	1,117 85
Total as before.....	<u>11,366 87</u>

Agreeably to a circular from the topographical bureau, dated June 11, 1857, I am directed to present a statement of all arrearages remaining due on account of the improvements under my charge. In reply I can only state that, with the exception of a few cases of forfeiture, by reason of desertions, no claims have arisen under my personal superintendence that have not been duly adjusted and cancelled. I have been informed, however, that sundry unsettled accounts for services, &c., rendered under the superintendence of my predecessor, together with a claim of considerable amount, set up by one of the Falls pilots of this city, for the removal of obstructions from the Indiana chute of the Falls of the Ohio, remain unsettled. The names of the claimants, and the nature and extent of the claims, to the best of my knowledge, are as follows :

Jesse Vansickle, for blasting and removing rocks from the Falls of the Ohio, about.....	\$1,480 00
Hugh Findreu, for expenditures incurred on account of the improvement of the Mississippi, about.....	286 44
Andrew Ferguson, deceased, on account of the improvement of the Missouri river.....	32 66
Rodgers & Noel, for articles furnished on account of the improvement of Missouri river.....	8 65
Kingsland & Cuddy, for articles and services furnished on account of improvement of Missouri river.....	12 58



James Doyle, for articles, &c., furnished on account of the improvement of Missouri river.....	\$22 34
J. K. Dillingham, for medical attendance on his slave, on account of improvement of Arkansas river.....	50 00
J. T. Roberts, for extra services on account of the improvement of Arkansas river.....	180 00
Thomas Johnson, for labor furnished for the improvement of the Illinois river.....	2 50
M. D. Dubois, for services as watchman for ditto .....	8 25
John Calvin, for sundry provisions for ditto .....	9 11
Amounting to .....	<u>2,092 53</u>

With the exception of the claim first noticed in the foregoing list, the others are supposed to have been predicated upon services rendered and articles furnished under the superintendence of Lieutenant Colonel Johnston; and embrace all the outstanding claims relating to the improvement of the western rivers of which I now have any knowledge.

The claims above enumerated may probably be supported by well authenticated vouchers; and on their presentation for settlement will be forwarded to the bureau for approval prior to their liquidation.

Receipts and expenditures by C. A. Fuller, esq., United States agent for the improvement of Red river at and near the raft:

Unexpended balance in the possession of Agent Fuller on the 1st of July, 1856.....	\$37,485 95
Amount expended during the fiscal year ending June 30, 1857, \$108 45 being deducted on account of errors admitted.....	<u>24,445 82</u>
Unexpended balance in the hands of Agent Fuller at the commencement of the current fiscal year, beginning July 1, 1857.....	<u>13,040 13</u>

Agreeably to the order of the War Department of the 11th December last, before cited, the improvement of Red river, as above, was continued under my charge and supervision.

Receipts and expenditures of Major John G. Floyd, United States agent for the improvement of the rapids of the upper Mississippi, for the third quarter of 1856, subsequently to which this work was transferred to the charge and supervision of Captain Wm. R. Palmer, agreeably to the order of the 11th December, above cited:

Unexpended balance in possession of Agent Floyd on the 1st of July, 1856.....	\$46,645 93
Amount expended for the third quarter of 1856, or first quarter of the last fiscal year, \$6 74 being deducted on account of error admitted.....	<u>4,814 61</u>
Unexpended balance in the hands of Agent Floyd at the end of the first quarter of the last fiscal year.....	<u>41,831 32</u>

Receipts and expenditures by J. C. Jennings, esq., late United States agent for the improvement of the harbor of Dubuque, for the third quarter of 1856, subsequently to which this work was also transferred to the charge and supervision of Captain Wm. R. Palmer, agreeably to the order cited as above :

Unexpended balance in the possession of late Agent Jennings on the 1st July, 1856.....	\$1,203 87
Amount expended for the third quarter of 1856, or first quarter of the last fiscal year, \$114 being deducted on account of errors admitted.....	21 55
	<hr/>
Unexpended balance in the hands of late Agent Jennings at the end of the first quarter of the last fiscal year, (September 30, 1856).....	1,182 32
	<hr/> <hr/>

To the balances, as above, remaining in the possession of agents on the dates above mentioned, should be added an unexpended balance of \$266 17, remaining in the hands of George A. Dunlap, esq., late United States agent for the improvement of the Illinois river, which still remains to be accounted for.

*Recapitulation of balances in the hands of United States agents, remaining to be accounted for.*

In the hands of Agent Fuller, July 1, 1857.....	\$13,040 13
“ Agent Floyd, October 1, 1856.....	31,831 32
“ Agent Jennings, October 1, 1856.....	1,182 32
“ Agent Dunlap, January, 1, 1856,.....	266 17
	<hr/>
Total of balances to be accounted for by United States agents.....	56,319 94
	<hr/> <hr/>

*Proceedings and operations in reference to western river improvements during the last fiscal year ending on the 30th day of June, 1857.*

The works in progress during the year embraced the improvement of the harbor of Dubuque; of the rapids of the Mississippi; of Red river, at or near the Raft; and of the Ohio river; the operations, in furtherance of which, prior to the 1st of September, 1856, have been explained with sufficient clearness in my annual report of the date just mentioned.

HARBOR OF DUBUQUE.

The proceedings, &c., in reference to the improvement at this point, prior to the 1st September, have been sufficiently explained in the report just before cited, and in sundry other papers previously submitted. The proceedings alluded to had for their object the preparation and execution of a contract with the Dubuque Harbor Company, by which the United States should be implicated in the prosecution of

the improvement to the extent only of the unexpended balance (about \$1,000) of the appropriation for the improvement of the harbor, approved August 30, 1852. The contract was predicated on terms specially prescribed by the War Department, and concluded in due form on the 6th of the same September. A copy of the contract is exhibited in the appendix subjoined hereto.—(See Appendix, Doc. No. 1.)

The superintendence of this improvement was transferred to Captain William R. Palmer, agreeably to the order of the War Department of the 11th December last, before cited.

On surrendering my charge of this improvement, and at the instance of sundry gentlemen of Dubuque, I took occasion to signify my views in reference to the capacity, utility, and importance of the harbor, in a letter addressed to the Hon. George W. Jones, a copy of which is appended to this report.—(See Appendix, Doc. No. 2.)

#### RAPIDS OF THE MISSISSIPPI.

Copious details, in reference to the works on the rapids, have been given in my last annual report, in so far as relates to their progress prior to the date of that paper, (September 1, 1856).

Under this head are comprised two distinct series of waterfalls, in the Upper Mississippi, separated from each other by a navigable reach of about one hundred and twenty-nine miles in extent.

The lower series is called the Des Moines rapids, and has an extent of about eleven miles; the upper series is called the Rock Island rapids, and has an extent of about fourteen miles.

The appropriation of \$100,000, approved August 30, 1852, was designed for the improvement of both of these rapids.

Surveys for ascertaining the character and extent of the work to be done under that appropriation were set on foot under my superintendence in 1853, and completed under the superintendence of Colonel J. E. Johnston in 1854.

The work of improvement of both rapids was put under contract by Colonel Johnston early in the year following, at the rate of \$5 85 per perch for blasting and removing rocks from the proposed channel way.

In the latter part of 1854, Messrs. Swan & Co., the contractors, abandoned the work by reason of the inadequacy of the contract price to meet and cover their outlays and expenditures.

On and after the abandonment, as above, there remained of the appropriation an unexpended balance of \$56,738 02, as reported by Agent Floyd. Of this balance \$35,927 was made applicable to the improvement of the Rock Island rapids, agreeably to a decision of the War Department, dated September 14, 1854. The disposition made of the sum thus set apart will hereafter be noticed.

Subsequently to the events above considered, and by order of the War Department, dated in the latter part of March, 1855, I was directed to relieve Colonel J. E. Johnston, and again resume the superintendence of western river improvements, which was done on the 27th of that month; and at an early date thereafter I instructed

Agent Floyd to make all proper arrangements for the re-letting of the work to other contractors.

Proposals were accordingly called for in due form by the agent, and a re-letting was effected on the 26th of May following, at \$9 per cubic yard; J. H. Hager, esq., of Terre Haute, Indiana, being the successful proposer, at this price. Accordingly a new contract was made with this gentleman, and he commenced operations in conformity thereto on the 15th of September, 1855.

Under the new contract the work was prosecuted with signal efficiency, the drilling of the rocks being effected by steam instead of manual power. A brief account of the means and manner of the operations is contained in my inspection report of September 6, 1856, an extract of which is hereto appended.—(See Appendix, Doc. No. 3.)

Owing probably to a misapprehension of the agent in regard to the import of certain instructions issued from the War Department, and given to him by Colonel Johnston, the operations under the new contract have hitherto been applied exclusively to the improvement of the Des Moines rapids, to such an extent that the balance remaining for the improvement of the Rock Island rapids is only about \$24,000, instead of \$35,927, as before stated.

A report of agent Floyd, dated on the 1st of December, 1856, shows that the amount of work done under the new contract with Mr. Hager is only 2,197 cubic yards, instead of about double that amount, which was called for by the contract, for the time occupied. The reasons of this delinquency are given in a letter from Mr. Hager to Agent Floyd, and submitted by the latter to the superintendent, with comments thereon; copies of which are hereto appended.—(See Appendix, Docs. No. 4 and No. 5.)

No decision in reference to the forfeiture of the contract was authorized to be given prior to the transfer of this work to Captain Palmer.

#### DES MOINES RAPIDS.

An appropriation of two hundred thousand dollars for the improvement of the Des Moines rapids was passed by a two-thirds majority of Congress on the 16th of August, 1856; and on the 9th of September following, instructions were issued from the topographical bureau, prescribing a new contract for the improvement of the Des Moines rapids under this appropriation.

The agent was accordingly instructed to call for proposals by public notice, which was done in due form, and the call responded to in a series of bids varying from \$5 80 to \$12 50 per cubic yard for blasting and removing rocks from the channel, under the direction of the agent.

The proposals were opened on the 15th of November, 1856, and the terms of each proposer, together with the credentials of character and competency furnished by each respectively, were duly communicated to the bureau; but no final award had been decided upon at the time of my being relieved from this branch of the public service, agreeably to the department order of the 11th of December before cited.

The means and appliances contemplated to be used in executing

the work of this new contract are similar to those relied upon under the contract with Mr. Hager, as explained in appendix, Doc. No. 3, before cited.

#### ILLINOIS RIVER.

The craft and other apparatus employed for the improvement of this river had been laid up for safe-keeping at Clifton, a few miles above Alton, the work of improvement of that river having been suspended late in the fall of 1855, for want of funds for its further prosecution. The severe frosts of the succeeding winter and the exceeding dryness of the following summer had contributed to render the boats leaky and unfit for use, without being repaired. An opinion was entertained that the craft in question might advantageously be transferred to Agent Fuller for employment in removing the raft of Red river, or to Agent Floyd for service in improving the rapids of the Mississippi. Both of these officers were invited to examine the craft, but after having witnessed the condition of the boats, &c., both declined the acceptance of them, by reason of the cost and trouble of repairing and conveying them to their respective agencies.

Failing to effect a transfer on reasonable terms, I recommended that the whole be offered at public sale for a sum not less than eight hundred dollars. The recommendation was sanctioned by the War Department, and after due notice given, the sale was effected on the 1st of January, 1857; the highest price bid for the whole being eight hundred and thirty-five dollars, which was of course accepted.

#### OHIO RIVER.

Within the last fiscal year two successful efforts have been made for the improvement of this river, viz: one by Captain J. R. Hamilton, and the other by Captain Jessie Vansickle, both duly commissioned as Falls pilots. The work done under the direction of the former (Mr. Hamilton) consisted in the removal of the wreck of the steamer *Magnolia* from the Point of Rocks, about 250 yards below the mouth of the Louisville and Portland canal, and that done under the direction of the latter (Mr. Vansickle) consisted in the blasting and removal of rocks from the Indiana chute of the Falls, which last, I am inclined to believe, has materially benefitted the navigation of that channel of the river.

Captain Hamilton's case has been submitted to the War Department, accompanied by a letter from the undersigned to the Hon. H. Marshall, in which are presented the fairest and most authentic lights in relation to the matter, upon the strength of which and of other concurrent testimony an allowance of \$559 91 has been awarded to Captain Hamilton. A copy of the letter is hereto appended.—(See Appendix, Doc. No. 6.)

The work of Captain Vansickle, as I have been credibly informed, has been executed at a cost considerably greater than that of Captain Hamilton.

As yet I have not been able to obtain any duly authenticated details

in reference to the work done by Captain Vansickle; but, on being sufficiently apprised thereof, and of the nature and extent of his claim therefor, I will endeavor to prepare and submit to the bureau a reasonable voucher for the approval of the department.

#### LOUISVILLE AND PORTLAND CANAL.

At the instance of the Hon. J. Guthrie, late Secretary of the United States Treasury, I was requested to signify my views in reference to the construction of locks at and near the site of the existing locks of the canal, and to the best method of enlarging the canal. In compliance with this request, and in conformity to the opinions of the Hon. Secretary, a method of improvement, having for its objects the construction of a single lock of suitable capacity and an enlargement of the canal to such an extent that the largest boats now used for the navigation of the Ohio might freely pass through the canal, was recommended to the Hon. Secretary. Another object, deemed of equal importance, was also kept in view, viz: the exclusion of floods from the entire canal, locks, &c., by a suitable guard gate, piers, wing wall, &c., at the head of the canal, and by an elevated embankment on its northerly side, the guard gate, wing walls, and embankment all rising at least two feet above the surface of the highest flood ever known in the Ohio.

The views entertained in reference to this improvement are more fully explained in a report to the honorable Secretary, dated July 18, 1856, a copy of which is hereto appended.—(See Appendix, Doc. No. 7.)

The surveys, &c., were prosecuted with all practicable diligence in subserviency to the method of improvement contemplated in the document just referred to till the means of continuing and completing them were withheld by the board of canal directors.

The expenses of the surveys were defrayed out of the pecuniary proceeds arising from the tolls of the canal.

#### MISSISSIPPI, MISSOURI AND ARKANSAS RIVERS.

Nothing has been done by the United States towards the improvement of these rivers during the last fiscal year, except in so far as relates to the improvement of Des Moines rapids and of the mouths of the Mississippi, the latter of which will be more particularly noticed in the sequel.

#### RAFT OF RED RIVER.

The prosecution of this improvement has been attended with numerous embarrassments of a character to retard its progress and greatly to enhance its cost. Among the impediments in the way of its advancement, the insalubrity of the raft district, the difficulty of procuring and retaining laborers, the scarcity and consequent high prices of provisions and labor, and the sickness and frequent desertions of the employes, are the most considerable. Efficient laborers, white or black, could not be obtained at a cost less than \$30 per month for each



hand, besides their board and, in most cases, their conveyance from remote points.

The progress of this work, from the beginning of the last fiscal year to the 1st of September, 1856, has been set forth in details sufficiently copious in my annual report of that date and in the documents appended thereto. The operations subsequently performed are sufficiently explained in the annual report of Agent Fuller, hereto appended.—(See Appendix, Doc. No. 8.)

From the report above cited, and other communications from the agent, it appears that the force in service at the commencement of the last fiscal year consisted of only sixteen black and three white laborers—in all, nineteen laborers; having been reduced to this number by desertions, sickness, two deaths, discharges, and withdrawals of slaves by their owners.

In order to replenish his force with trustworthy and reliable laborers, the agent, after having endeavored in vain to obtain black hands from the Red river planters, deemed it advisable to repair to Illinois and Indiana in quest of white laborers. In this way he succeeded in engaging the services of about forty fresh hands; but on or before the arrival of this additional force at the raft, sixteen of their number deserted, and one was discharged on account of sickness.

The desertions continued till the 23d of October, when the entire force was reduced to fourteen white and nine black laborers. From and after this date to the end of the fiscal year the nature and progress of the operations on the raft, &c., are sufficiently explained in the annual report of Agent Fuller, before cited.—(See Appendix, Doc. No. 8.)

The force at the end of the year consisted of only about fourteen individuals, who are represented as having been advantageously employed in removing stumps from the bayou and lake passes, and in storing more compactly the fragments of the raft in the outlets of the bayou and in the neighboring small lakes.

The unexpended balance of the appropriation having been reduced to about \$13,000, the propriety of increasing the force, till a new appropriation shall have been made, is very questionable. In the meantime, it is believed that the force now in service can be employed to advantage on the work now in progress, as just mentioned.

#### REMOVAL OF OBSTRUCTIONS FROM MOUTHS OF THE MISSISSIPPI.

By an act of Congress, passed on the 8th July, 1856, \$330,000 was appropriated for this improvement. With the sanction of the War Department, the work of improvement was arranged under two distinct heads, viz: the removal of obstructions from the Southwest Pass and the removal of obstructions from the Pass à l'Outre, each of which were to be carried into effect by a special contract.

Proposals were publicly invited for each division of the work, as above, and resulted in favor of the bids offered by Messrs Craig & Rightor, of Newport, Kentucky. The bids of these gentlemen were as follows, viz: \$125,000 for opening a channel 300 feet wide and 20 feet deep, leading in a straight direction across the tidal bar, or shoals,



at the outlet of each pass, and \$36,000 for keeping the channel in each pass open and unobstructed during a period of four and a half years from and after the inspection and acceptance of the work, under the clause of the contract for opening the channel in each case.

The parties to the contracts were Captain H. G. Wright, of the corps of engineers, and agent for the United States, of the first part, and Messrs. Craig & Rightor, as above, of the second part. The contracts were executed in due form on the 13th of November, 1856, and approved by the honorable Secretary of War on the day following.

The stipulations of the contract provided for a speedy commencement of the work, and for the opening of a channel in both passes of the dimensions above stated in a period of ten months from the date of the contracts, to wit: on the 15th September, 1857.

The method of improvement proposed by Messrs. Craig & Rightor, and sanctioned by the War Department, contemplated the formation of jetties or lines of piles on both sides of each channel, through greater or less distances, converging towards each other as they approached the tidal bar; in addition to which works of a similar construction were to be erected across the outlets of both passes, above the convergent lines above mentioned, for the purpose of preventing outflows, and compelling them to pass between the jetties.

The plan and details of the improvement having been specifically provided for by the contracts, its prosecution was at first confided to the supervision and inspection of Major G. T. Beauregard, of the corps of engineers, and was subsequently transferred to the charge of the undersigned early in April last, soon after the commencement of operations by the contractors of Southwest Pass.

My proceedings in reference to this service are sufficiently explained in my inspection reports of the 6th of April, and a continuation thereof dated on the 5th of May following, copies of which are hereto appended.—(See Appendix, Docs. No. 9 and No. 10.)

The operations of the contractors, agreeably to their own choice, have hitherto been confined exclusively to the Southwest Pass, no attempts having as yet been made towards the improvement of Pass à l'Outre.

The line of piles on the left or southeasterly side of the Southwest Pass on the 30th June last had an extent of about 3,200 feet in a direction south,  $40^{\circ}$  west towards the Gulf, or north,  $40^{\circ}$  east in the opposite direction. All the work done by the contractors previously to that date had been bestowed upon the line mentioned, nothing having been done toward the formation of a counter line of piles on the other side of the pass, or to the blocking up of outlets on either side of the pass.

The work of the contractors, from its incipency to the end of the fiscal year, has been unavoidably retarded in its progress by unfavorable weather; and on at least three occasions extensive portions of the line have been so much deranged and disrupted by storms that a reformation of a part of the line was rendered indispensable. Although the formation of the line had been occasionally carried forward at the rate of 100 to 150 feet per day in the month of May, yet during the month of June its entire prolongation amounted to only 300 feet, 100

of which was prostrated by a violent southeast storm, leaving for the aggregate length of the line standing on the 30th of June about 3,200 feet.

From the soundings made on the lines of the triangulations, and especially from those made upon lines crossing the main navigable channels, it does not appear that any considerable changes have been produced in the pass by the operations of the contractors prior to the date last mentioned.

For particulars in reference to the topics just considered, see Appendix, Doc. No. 11, and Doc. No. 12 and Doc. 13, being copies of my reports of the monthly progress of the work.

In fairness to the contractors, and in so far as relates to the enlargement of the channel at the Southwest Pass, it is proper to withhold any decisions as to the final efficiency of their operations till the expiration of the period of their contract, which will terminate on the 15th of September next.

But in relation to the improvement of Pass à l'Outre, the fact that nothing appears, as yet, to have been done thereat towards its improvement, seems to authorize the inference that the contract for this improvement must unavoidably be abandoned by the contractors, the unexhausted period of their contract being only half a month.

The subject next claiming attention is the further prosecution of works of improvement on the western rivers. My views in reference to this subject have been fully presented in my unpublished report of September 1, 1856, under the head of "Estimate of funds required for the prosecution of western river improvements during the fiscal year beginning July 1, 1857, and ending June 30, 1858." The same views, with a few modifications relating to the improvement of Red river, and with the omission of any provision for the improvement of the Des Moines rapids and other local works, are deemed equally applicable and appropriate to the said improvements under existing exigencies, and are referred to accordingly as a component part of this report.

The item requiring modifications, as above, is amended as follows, viz:

In addition to the craft now for service in Red river, a steam dredge boat, with mud scows, yawls, &c, should be procured at a probable cost of \$10,000. The cost of working the dredge boat, &c., for nine months may be estimated at \$850 per month, or \$7,650 per year.

Hence the corrections in question being applied to the statements in reference to Red river, as contained in the cited estimate, will give the following summary results, viz: Cost of craft for the improvement of Red river, including a dredge boat, scows, &c., \$28,000; annual cost of working and preserving said craft, the dredge boat, scows, &c., included, \$52,350.

The same corrections being introduced into the tabulation, near the end of the estimate referred to, will give the following as the corrected tabulation for this report:

*Table of appropriations for a series of five years.*

	Estimated prime cost of craft and working same for first year.	Estimated annual cost of working craft for 2d, 3d, 4th, & 5th years respectively.
For improvement of Mississippi river.....	\$172,900	\$92,400
Missouri river.....	94,600	59,100
Arkansas river.....	58,900	38,400
Red river.....	80,350	52,350
Ohio river.....	71,700	38,700
Illinois river.....	24,800	9,300
Annual amounts.....	503,250	290,250

With respect to the adoption of a system of annual appropriations for the prosecution of western river improvements, I conceive there can be no doubt of its propriety and economy. On at least three different occasions liberal appropriations have been made by Congress for this service, covering the cost of the various kinds of craft, &c., required for the service, and the working of the same for a period limited by the balances remaining for the prosecution of the work after deducting the cost of the craft. In each of the instances alluded to the balance in question was sufficient merely to keep the craft employed in the public service during a period of two or three years only; after the expiration of which the craft, together with its equipments, &c., has been sacrificed at public sale for less than one-sixth of their prime cost. In this way nearly one-half of the prime cost of the boats, &c., procured under each appropriation for western river improvements has been virtually wasted. It is believed that the sacrifices thus incurred may be avoided by adopting the system of appropriations herein suggested, and exemplified in the table.

It will be perceived that no provision has been made in the table for any works of a local character, or for the removal of obstructions from the mouths of the Mississippi. The improvements of the rapids of the Mississippi and Dubuque harbor have been transferred to Captain Palmer, while the late appropriation for the improvement at the mouths of the Mississippi has been encroached upon to the extent of \$2,500 only, and needs no addition for the current fiscal year.

#### COMMERCIAL STATISTICS AND STEAMBOAT DISASTERS.

The compilation and arrangement of the various details of information proper to be embraced under these heads has been confided to Doctor M. P. Breckinridge, who has been employed for some time past as recorder and accountant in my office, and who has been requested to visit Cincinnati, St. Louis, and other commercial points, in quest of the desired information. His report on these topics is hereto appended.—(See Appendix, Doc. No. 14.) A full and clear exhibit of

all the items of intelligence appertaining to western commerce would be attended with great labor, trouble and expense, far greater than I have had it my power to bestow, either personally or by proxy.

In the document referred to a brief abstract merely has been attempted, with the view of exhibiting the more prominent features of the subject. The sources whence the information has been derived are duly recognized and acknowledged in the document.

With respect to the utility and importance of the several lines of communication—viz: of rivers, canals and railroads—in a military point of view, and the facilities, despatch and cost with which troops and military supplies of all kinds can be conveyed from point to point, or from one commercial depot to another, they may be readily inferred from the tables contained in the document referred to, in which the distances between important points are exhibited in miles, the duration of the transit for freights and for passengers over these distances, and the ordinary cost of conveyance for freights and passengers through the same distances are exhibited.

Respectfully submitted,

S. H. LONG, *Lieut. Col. Top. Eng.,*  
*Late Superintendent Western River Improvements.*

Colonel J. J. ABERT, *Chief Topographical Engineers,*  
*Washington, D. C.*

P. S.—Letters from Captain Johnson, dated on the 31st ultimo, inform me that no favorable changes in the width and depth of the channel at and near the mouth of the Southwest Pass, produced by the operations of Messrs. Craig and Rightor, were perceptible at that date. Also that the smallpox had broken out among their laborers, and that they had been compelled to repair with their pile boat, &c., to New Orleans in quest of medical aid.

S. H. LONG, *United States Army.*

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## APPENDIX.

### DOCUMENT No. 1.

*Contract—Charles Gregoire, president, with S. H. Long.*

This agreement, made between the president of the Dubuque Harbor Company of the first part, and the government of the United States of the second part, witnesseth: That the said party of the first part agrees to construct a causeway leading in a direction south  $65\frac{1}{2}^{\circ}$  east from the foot of First street, in the city of Dubuque, to the point "A," on the river side of the outer island, immediately below the main outlet of Dubuque harbor, said causeway to be surmounted by a roadway 30 feet wide, to be elevated at least 3 feet above extreme high water of the river, to be furnished with a slope of 1 in 6 on its upper side, the whole to be completed in one year from the date hereof, unless prevented by the prevalence of high water in the river.

And it is further agreed that so much of the material for the causeway shall be taken from the bottom and sides of the channel leading from the main river, through waples cut to the slough or basin, whenever said channel is touched by the causeway, as will leave the channel 200 feet wide, or of a width and depth not less than what exists at present. The position and direction of the causeway to be determined by an officer or agent of the United States, and the work carried on to completion in accordance with such determination and plans as approved by him.

In consideration of the work done on said causeway, and after the same shall have been completed, the United States agree to pay to the said party of the first part the balance of appropriation remaining on hand, after all just liabilities incurred by the United States are paid. Said balance to be paid by the United States, through their agent, after the agent, from inspection, shall have ascertained that all the provisions of this agreement, as regards the construction of the causeway, shall have been fulfilled by said party of the first part.

And it is further agreed that any expense incurred by the party of the first part in the construction of the causeway over and above the balance of appropriation paid to them shall not constitute any grounds for a claim against the United States, or against any further appropriation which may be made by Congress for the further improvement of the harbor of Dubuque. And said causeway shall remain a free and open highway.

Done in triplicate, this 6th of September, 1856.

CHARLES GREGOIRE,  
*President Dubuque Harbor Company.*  
S. H. LONG, U. S. A.,  
*Superintendent Western River Improvements.*

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DOCUMENT No. 2.

*Colonel Long to Hon. G. W. Jones.*

LOUISVILLE, December 22, 1856.

DEAR SIR: Having been apprised that sundry respectable citizens of Dubuque are desirous of some expression of my views in reference to the capabilities and importance of Dubuque harbor, I take leave briefly to offer, through you, some of my convictions on these interesting topics.

The site of the harbor is on the westerly side of the Upper Mississippi, in latitude about  $42\frac{1}{2}^{\circ}$  north, and is effectually landlocked and separated from the main river by a cluster of islands, which shield it from the encroachments of floating ice and other drift in all stages of the river, except in extraordinary floods, when the overflow covers the islands to the depth of a few feet only. During the periods of such overflow the influx of drift of all sorts may readily be prevented by the construction of levees of moderate height along the exterior margin of the outer island.

The present harbor or basin embraces an area of between two and three acres, in which there is a low water depth of about four feet, and is sufficiently capacious to accommodate some eight or ten steamers of ordinary dimensions, but is rendered inaccessible to such craft during the low stages of the river for want of a navigable channel connecting the harbor with the river.

By removing that portion of Bass island situated between Barney's cut and the line of the causeway in progress of construction by the Dubuque Harbor Company, and by dredging the inner and outer sloughs, including the site of Bass island and the main outlet of the harbor, to the depth of four feet below the surface of extreme low water, the harbor may readily be enlarged to an area of more than twenty acres, and to a capacity sufficient to accommodate more than one hundred steamers with safe protection during the period of the winter frosts.

The materials excavated by removing Bass island, dredging, &c., may be employed to great advantage in the formation of levees, terraces, causeways, &c., of earth work upon the islands, across the sloughs, and around the harbor, by means of which not only will the capacity of the harbor be enlarged, but the facilities for business transactions connected with it will be incalculably multiplied.

The number of steamers now plying on the Mississippi above Rock island, during the season of navigation, may be computed at about twenty, and will, in all likelihood, be increased to at least one hundred in the course of eight or ten years, most of which may readily and conveniently find and occupy a safe and commodious harbor at Dubuque.

The importance of this point is greatly enhanced from the fact that it has been made the terminus of the Great Central Railroad of Illinois on the Upper Mississippi; also from the consideration that other railroads, leading southward, westward, and northwestward, which are not merely in project, but some of them actually commenced, diverge from the same point, and lead through a region of incalculable wealth in an agricultural and mineral point of view.

The population of Dubuque amounts at this time to about eight thousand inhabitants, and is rapidly increasing at the rate, probably, of more than twenty per cent. yearly, so that in less than five years it will amount to more than double that number.

To the best of my knowledge and belief, there is no other position on the Upper Mississippi that presents equal facilities for the construction of a capacious, safe, convenient, and commodious harbor in any of these respects comparable to those afforded at Dubuque.

S. H. LONG.



## DOCUMENT No. 3.

[Extract.]

*Colonel Long to Colonel Abert.*

The means employed consisted of a substantial drill boat worked by steam; of a large decked scow, for the reception and removal of the broken fragments of blasted rock; of a quarter boat for the accommodation of the working party, and of a yawl, and sundry other items of craft and appliances, procured by the contractor for the execution of the work of his contract.

The principal machinery used in connexion with the craft consisted of a steam engine of six horse power, employed in working a drill weighing between 2,500 and 3,000 pounds.

The drill is composed of two pieces, viz: a cutter or bit of cast steel highly tempered, weighing about fifty pounds, and a rod or stem of wrought iron weighing upwards of 2,000 pounds, (the rod and bit, together, weighing upwards of 2,500 pounds, as before stated;) these two parts being suitably connected together by means of a socket attached to the rod, a tenon to the bit and a key passing through both. The strokes made by the drill number fifty per minute; the drop of the same is twenty-two inches; the hole made or bored by the same is four and a quarter inches in diameter, and the time required for boring a hole four and a quarter inches in diameter and four to five feet deep is sixty minutes or one hour. The blast is effected by the use of about ten pounds of powder, properly enclosed in cannisters with tubes. The average quantity of stony fragments displaced at every blast is at least four cubic yards.

When reduced to fragments, as above, the stone is raised by means of a crane and grapples and deposited on the decked scows, before mentioned, and conveyed to positions where the agent has deemed it expedient to form wing dams for the purpose of preventing the passage of water currents leading athwart the improved channel.

NOTE.—Doubts are entertained with respect to the stability of structures of this sort at the place where they are contemplated to be formed. Ice and other drift brought down by the rapid current of the Mississippi will be likely to demolish and sweep them from their foundations.

The means at present employed for the removal and deposition of the broken fragments are far from being adequate for this purpose. Additional means are now in preparation, and are expected to be ready for use at an early future date.

A new method of operation, which has already been partially tested by the contractor and found remarkably efficient, is about to be adopted in the further prosecution of the work.

This mode contemplates the employment of a steam engine of ten horse power for the purpose of working a massive slicer or cleaver armed at the cutting end with a cuspidated cutter of cast steel, the whole instrument weighing about 3,000 pounds. The entire length



of the cleaver is to be about twenty feet, and its rise and drop about fifteen feet ; its movements are to be regulated between cheek timbers, &c., similar to those of the ram, &c., of a pile driver.

It is said that the means and mode of operation above considered have been found highly efficient and useful, at an expense comparatively moderate, in cleaving rocks at Albany, New York, lying six or eight feet below the surface of the water, and that similar benefits have resulted from their application to the rock excavations made for the canal at the Sault de Ste. Marie.

Agent Floyd appears confident of the beneficial results likely to spring from this method of operation, and from the best lights I can get in relation to the subject, I am inclined to concur in the same views.

S. H. LONG.

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DOCUMENT No. 4.

*J. H. Hager to Agent Floyd.*

KEOKUK, IOWA, October 28, 1856.

SIR: I regret to find, by your note of yesterday, that by inability during the present season to get out 1,500 yards of rock per month has given apparent cause to Colonel Long to complain that I have not complied with my contract.

As you are aware, the difficulty of procuring hands to caulk my boats, after all other preparations had been made, as early as it was supposed the stage of water would allow, prevented me from getting to work till early in August, and of course the work for that month did not amount to the required quantity.

The excavation in September was going on rapidly up to the 16th, when a cold spell of weather set in, which lasted until the 5th of October. During this time the cold was so unusually severe, for the season, that it was with great difficulty men could be induced to go into the water at all, and after they were in they could work to very little purpose. I procured water-proof boots for them, but this did not obviate the difficulty, and the result was, that it was impossible to get out the 1,500 yards during either month. The same sort of weather set in again, with heavy rains and a rise in the river, on the 20th October, and has continued until this date.

These circumstances will, I trust, be considered a sufficient excuse for what would otherwise seem to be a disregard of the obligations of the contract ; and I would be much obliged if you would communicate to Colonel Long a copy of this explanation.

J. H. HAGER.

## DOCUMENT No. 5.

*Agent Floyd to Colonel Long.*

KEOKUK, IOWA, October 30, 1856.

SIR: I herewith send you a copy of a note addressed by me to J. H. Hager, esq., contractor for the "improvement of the Rock River and Des Moines rapids," and also a copy of his reply. I am fully conscious of the difficulties he had to encounter in obtaining *caulkers*, and I informed you of it at the time; and I recollect, also, of hindrance by bad weather. But I am confident that Mr. Hager's greatest misfortune has been from the neglect, indolence, and bad management of his manager. In the occasional absence of Mr. Hager, I urged, in every way, more energy from his manager, but the result is as you have been informed.

The weather is now becoming too cold for work, and but little more may be expected this season; and there is, also, now a swell in the river from the late very severe storms, which, if it continues, will greatly impede the efficiency of the work. I think that the contractor is entirely disposed to fulfil his contract; and that he would undoubtedly do so another season, provided it should not be determined by the bureau that he has forfeited his contract.

J. G. FLOYD.

## DOCUMENT No. 6.

*Colonel Long to Hon. H. Marshall.*

LOUISVILLE, December 18, 1856.

SIR: At the instance of Captain J. R. Hamilton, an experienced falls pilot, who had been requested by sundry pilots, captains, and other commercial men, to remove a formidable obstruction from the main low water channel of the Ohio, at a point about 250 yards below the mouth of the Louisville and Portland canal, I am induced to offer the following remarks on the nature and character of the obstruction removed and on the cost of removing it.

The obstruction was occasioned by the wreck of the steamer *Magnolia* on the rocks at the point mentioned, the channel at which is only about one hundred feet wide. The boat, when wrecked, assumed a position athwart the channel, its stem protruding some fifty or sixty feet into the channel, and endangering the passage of boats between it and the shore of said island. Three or more steamers had been seriously injured in passing around the wreck, and at least three flat-boats were sunk by collisions with the wreck.

Captain Hamilton appears to have been encouraged and induced, by persons deeply interested in the navigation of this portion of the Ohio, to undertake the removal of the wreck, which he has successfully accomplished at very considerable cost. His account for expenditures

incurred amounts to \$559 91, which, in view of the circumstances of the case, the formidable character of the obstruction, and especially of the inadequacy of the means and apparatus that must be relied on for effecting the removal, may fairly be regarded as a reasonable expenditure.

I take leave to add that there remains in my possession a small balance of the appropriation of 1852, for "the improvement of the Ohio, including Cumberland dam," out of which, with the approval of the honorable Secretary of War, the account of Captain Hamilton may be liquidated.

S. H. LONG.

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DOCUMENT No. 7.

*Colonel Long to Hon. J. Guthrie.*

OFFICE WESTERN RIVER IMPROVEMENTS,  
*Louisville, July 18, 1856.*

SIR: I have the honor to be in receipt of your favor of the 10th instant, relating to surveys for a new set of locks and for the enlargement, &c., contemplated for the Louisville and Portland canal.

In a former letter I communicated sundry views and suggestions in relation to the canal, which I take leave to explain more clearly and intelligibly on this occasion, and in the following order:

*Of the locks at the lower end of the canal.*

1. It is proposed to construct a single lock at the lower end of the canal, trending downward from its head, somewhat more nearly in the direction of the river than the existing series of locks, for the purpose of rendering the ingress and egress of large boats, in connexion with the river below, more safe and easy.

2. In order to render the locks passable for the largest boat navigating the Ohio, the length of its chamber must be 360 feet and its width 75 feet in the clear, those being, as nearly as I can ascertain, the length and width of the steamer Eclipse.

3. The lift of the lock, in ordinary low water, must be at least 25 feet, this dimension being equivalent to the aggregate fall of the Ohio between the head and foot of the canal.

4. The floor of the lock chamber, or rather the tops of the mitre sills, should be at least five feet below the surface of ordinary low water, in order to admit the passage of boats drawing at least five feet.

5. The height of the lock walls should be about three feet greater than that of the highest surface water both of the lock and of the canal, at the stage (10 feet above ordinary low water) when the canal becomes useless by reason of the greater facilities for navigation presented by the main river. Hence the height of the walls should embrace the following subordinate dimensions, viz: five feet for draught of boats, twenty-five feet for lift, and three feet in order that the

guards of boats may never rise above and lodge upon the copings of the walls; thus making the aggregate height of the lock walls above the mitre sills of the lock forty-three feet.

6. The lock chamber should be furnished with four sets of gates, all of the same size, viz: one set near the head and one at the tail of the lock; besides which there should be two intermediate sets, for the purpose of rendering the lock divisible into three distinct chambers, of the following different lengths, viz: from the head to the first intermediate gate 160 feet, from the head to the second intermediate gate 260 feet, and from the head to the tail gate 360 feet.

7. By this arrangement boats and other craft of small dimensions may be accommodated in the first chamber; boats, &c., of a larger size in the second chamber, and boats of the largest class in the third chamber. The arguments in support of these arrangements are as follows:

First. The detention for lockage will be materially reduced, which is also true in regard to the quantity of water required for lockage. In view of the variety of craft likely to pass through the lock, the detention for lockage and the lockage water required will probably be less than half that would be expended without the intermediate lock gates.

Second. The quantity of silt or sedimentary deposits brought into the canal and lock would also be less in the same proportion by adopting the arrangement in question. Accordingly the balance resulting in favor of the arrangement, on the score of economy, would fairly entitle the same to a preference over any arrangement that could be adopted, without the use of one or more sets of intermediate gates.

8. The height of the gates above the mitre sills should be about forty-one feet, or two feet less than that of the lock walls. The width of each leaf will be about thirty-nine feet. Each leaf may traverse on its own quoin-post, being effectually sustained by means of iron stays, with screw stretchers passing from the head of the quoin-post to points at or near the lower end of the toe-post. In this way the toe of the gate may readily be elevated or depressed at pleasure, and made to swing clear of the lock floor without the intervention of circular rails and friction rollers.

9. The chambers may be filled or emptied through wickets, or scuppers with fly-gates, situated in each leaf near the bottom of the gates, or by side culverts, &c., in the lock walls, as usual.

10. N. B.—The main reason of making the head gate of the lock of the same height as that of the other gates thereof is, that in filling a lock of so great a lift the jets of water from scuppers situated twenty-five feet above the surface water of the lock (which would be the case in ordinary low water) would unavoidably be poured on the decks of the boat, either at its bow or stern, and occasion serious inconvenience and injury on board, which would not be the case when the jets are made below the surface of low water in the lock.

*Of the canal enlargement.*

11. Assuming 75 feet as the width of the lock chamber, the width of the water way of the canal should be about 100 feet. This width would leave for windage on both sides of a boat 75 feet wide, 25 feet, or  $12\frac{1}{2}$  feet on each side, which I regard as a suitable allowance merely for a boat of that width, the movements of which, in passing through the canal, ought to be regulated by her rudder. According to the facilities for propelling a boat through the canal by the use of steam, will be the speed of her movements. In a canal whose width does not exceed that of the lock chamber, the movements of the boat must, unavoidably, be retarded, and sometimes entirely arrested by frequent impacts against the sides of the canal.

12. The enlargement should be made on the northerly side of the canal, in order that the excavations required therefor may be applied to the formation of an embankment and causeway on that side, rising to an elevation at least two feet above the surface of the highest known flood. This would give for the height of the embankment above low water 42 feet at the head of the canal, and 67 feet at the foot of the canal.

13. The side walls of the canal should rise to the level of the lock walls, viz: 43 feet above the mitresills of the lock, or 18 feet above the bottom of the canal. At this height the tops of the walls would rise above the guards of a boat at the highest stage of water for canal navigation.

14. The slopes of the embankment should rise from the summit of the canal and lock walls, at the rate of  $1\frac{1}{2}$  to 1, quite to the grade or roadway at the top of the embankment.

15. At least two passing places should be provided for on the southerly side of the canal, in addition to that at the head of the lock, each of which should have a width equal, or nearly so, to the width of the canal. One of these should be situated, if practicable, at the point most suitable for the pivot drawbridge.

16. The drawbridge should traverse horizontally, on a suitable stone pier erected for its support, about midway of the line between the canal and the passing place. The draw should rest upon a properly constructed turning table and platform, covering the head of the pier. Thus situated, one end of the draw would span the canal, while the other would span the passing place; and, being in itself equilibrated on the platform and top of the pier, may readily be made to traverse back and forth on its pintle in a manner to admit the passage of one or two boats at once, as occasion may require.

*Of the guard gate and its piers, &c.*

17. The guard gate should be located in the basin at the head of the canal. Its piers and the guard gate should rise at least 42 feet above the surface of ordinary low water at their base, and should be arranged in such a manner that the shore pier head may serve as a boom post for the shore end of a boom, and the river pier head as a

post for the other end of the boom, the former being situated further up the river than the latter, in order to afford the requisite obliquity to the boom when stretched from one pier head to the other. The shore pier should be connected to the shore by a wing wall of the same height as that of the piers and gates. In like manner the river pier should be connected to the embankment or causeway by a wall, all being of a uniform height.

18. The gates should consist of two leaves to each, the lower leaf rising about 20 feet above the mitre sills, and the upper leaf rising about 27 feet above the top of the lower leaf. The lower leaves are designed to be short, whenever there may be occasion to employ the canal for any purpose whatever, while the upper leaves are to subserve the purpose of stopping the ingress of water into the canal space whenever a freshet rising above the lower set of leaves may occur.

19. The boom should be of a coffer form, about fifteen feet wide, one hundred feet long, and five or six feet deep, constructed somewhat after the manner of a flat-boat, square at both ends. Such a boom may readily be floated to the heads of the piers, and occupy a position oblique to impinging currents, drift, &c., and prevent the accumulation of drift, &c., between the piers and above the guard gates whenever the higher stages of the river render the canal useless. On the subsidence of such freshets the boom may readily be withdrawn and moored in some suitable place, the guard gates thrown open, and the canal made free for the passage of boats.

20. Thus fortified and protected by the high embankment through the whole extent of the canal on its northerly side, and by the guard gates, piers and wing walls at its head, the canal will be exempt from overflows by floods loaded with drift, suspended silt, &c., and secure from the deposition of floating materials and sedimentary deposits. Inundations of the entire canal space in rear of the embankment and below the guard gate will, of course, occur in very high freshets, but such overflows will be occasioned exclusively by *back water* entering from below the canal after having parted from its drift and deposited its silt to such an extent as will exempt the canal from annoyances of this character.

21. The views attempted to be sustained by the foregoing remarks seem, in a few instances, to be somewhat in conflict with some of the suggestions contained in your letter. I have deemed it expedient to present, in a more intelligible form, sundry leading objects, and the reasons therefor, as contemplated in my hurried letter of the 16th ultimo.

22. The whole is respectfully submitted to your arbitrament with the desire of obtaining your concurrence, or, rather, your decision, in regard to their relevancy or otherwise.

23. I have had a brief interview with the president and directors of the Louisville and Portland Canal Company, who concur in the propriety of commencing the surveys as soon as practicable, by wings at and near the foot of the present canal, for the purpose of ascertaining the position, depth below the surface, and configuration of the rocks underlying the canal at that point. The developments expected



to be made in this way are regarded as suitable preliminaries to a judicious location of the contemplated new lock.

I propose to enter on the field work of the survey within a few days.

S. H. LONG.

DOCUMENT No. 8.

*Agent Fuller to Col. Long.*

OFFICE RED RIVER IMPROVEMENTS,  
August 12, 1857.

SIR: I have the honor to submit my annual report on the state and progress of the work committed to my charge, viz: the improvement of Red river at and around the raft, for the fiscal year beginning July 1, 1856, and ending June 30, 1857.

My receipts and expenditures during the year on account of this service are as follows, viz :

*Receipts.*

Balance on hand July 1, 1856.....	\$37,485 95
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*Expenditures.*

Amount expended third quarter, 1856.....	\$4,394 99
Amount expended fourth quarter, 1856.....	7,436 70
Amount expended first quarter, 1857.....	8,931 65
Amount expended second quarter, 1857.....	3,682 48
	<hr/>
Total expended.....	24,445 82
	<hr/>
Balance on hand June 30, 1857.....	13,040 13
	<hr/> <hr/>

At the close of the last fiscal year the white laborers employed on this work had nearly all been discharged, their term of service having expired. The steam snag-boat Gopher was laid up at Coshatta Bluffs for repairs, and the laboring force of thirteen blacks went into camp on the banks of Dooley's bayou, to be employed with the hand machine boat during the summer, under charge of the master of the Gopher, Captain Dillingham, in removing obstructions to the navigation of the bayou and lakes, and in doing such other work as might be found necessary there during the low water season. The force was entirely too small to enable me to prosecute the work with the desired success, or to complete the removal of the obstructions between the head of Dooley's bayou and that of Stumpy bayou, as contemplated in my last annual report. All my efforts to increase the black force, by hiring from the planters within a distance of one hundred miles, were futile. On the contrary, several of those engaged were either withdrawn by their owners, or having gone home without permission, were suffered to remain there. The river during the summer was at a remarkably low stage—one most favorable for operating successfully ;



and, with an addition of eight or ten laborers, I could probably have removed all the stumps, logs, &c., throughout the entire distance referred to. The force employed, however, succeeded in pulling up and removing with the machine boat, during the low water season, seven snags and 238 heavy stumps; and, in addition thereto, cut down to a level with the bottom 951 stumps, besides digging up roots, cutting down small islands, and felling impending trees.

On the 15th September a very heavy freshet occurred unexpectedly while the party was at work down the bayou, which not only suspended low water operations, but brought with it a heavy run of timber from the upper waters of Red river, and caused an accumulation of raft in the vicinity of Elmer's bayou, and near the head of the original raft, of more than a mile in length.

From that date till the latter part of October the force was employed in cutting and hauling light raft through the bayou to the first small lake, and stowing it therein.

During the summer the Gopher and machine boat were painted, caulked, and otherwise repaired.

On the 16th of October the new force of white laborers, which had been shipped in Kentucky and Indiana, arrived at the work. Of the thirty-nine who left New Albany, but thirty-three reached Coshatta Bluffs; one was accidentally killed, two were drowned, two deserted, and one was discharged, sick, at Shreveport. On the 17th, the day after their arrival, eleven deserted, and on the 21st nine more left, leaving me but thirteen out of the original thirty-nine. These men had all signed shipping articles to remain on the work until the 15th of June, 1857, unless sooner discharged, but, without good cause, deserted in gangs, led or controlled by one or two of the party. The rates of wages on the river, being from forty to fifty per cent. higher than those I feel authorized or willing to give, may have induced the desertion on the part of some; others found the work too dangerous or too laborious; while many left because their comrades were going. I had no power to retain them, they simply forfeiting whatever wages might be due them at the time.

With the small black and white force remaining the Gopher resumed service, and the work was prosecuted with all diligence till the ensuing March, when, learning that Congress had failed to pass the desired appropriation for the completion of the improvement, it was deemed advisable to reduce the expenses to as small a monthly expenditure as possible consistent with the good of the service for the preservation of the boats, &c., and to endeavor not only to keep the work open, but also to go on with the removal of raft, &c., until the action of the ensuing Congress could be known, a total suspension of the work being considered almost fatal to its successful completion. Accordingly, the steamer Gopher was laid up at Coshatta; the officers, (with the exception of the mate and watchman,) together with all the white laborers, were discharged; and the black force sent into camp, to be employed in working the machine boat, under charge of the mate of the Gopher, in storing raft and removing obstructions in the bayou. The water is now nearly low enough for resuming operations on the stumps in the lower part of the bayou

and in Shift Tail lake, and with an ordinary summer stage I am in hopes of completing their removal.

The present state of the work is briefly as follows: Upwards of three miles of old raft having been removed from Red river and stowed in Dooley's bayou and the small lakes, the route is open, though not completed, from Shreveport to Coshatta Bluff, on Red river, and might be navigated to the upper river were the mile of new raft removed. A cut has been partially made in Dutch John's lake, above the head of this new raft, both for the purpose of stowing raft, and of avoiding that portion of the river at which this new raft has lodged. An outlet into the river above Coshatta and below this raft will not only allow the river to pass through the lake, but will give a receptacle for the stowage of several years' run of timber. The route through Dooley's bayou, the lakes, and Twelve Mile bayou, to Shreveport, although susceptible of navigation, requires much labor to render it safe. A portion thereof, where it crosses Shift Tail lake, and the pass into the head of Soda lake, will need some dredging. A light draught dredge boat will be required for this purpose, and an estimate for the construction thereof will be submitted in connexion with the usual annual estimate.

Notwithstanding the representations of interested persons in favor of other routes, I am still of the opinion, all things considered, that the one adopted is the most favorable of all, and feel sanguine of the success of this improvement, provided the desired appropriation be made by Congress at an early date. The quantity of water passing through the new channel is constantly increasing; the bayou is widening, and already is larger and deeper than that portion of old Red river between the raft and Shreveport. The only evil I fear is delay in passing the appropriation. Every year's postponement causes an increase in the final cost of the work, not only from the accumulation of new raft, but also from the deterioration of boats, tools, and rigging. In submitting the required estimate, an increase of the amount called for in my last annual report will be necessary to cover these contingencies.

*Estimate for the fiscal year, commencing July 1, 1858, and ending June 30, 1859.*

Amount required as per annual report of Sept. 1, 1856	\$75,000 00
Preparing additional receptacle for new raft.....	8,000 00
Removing raft accumulated since last report.....	8,000 00
Deterioration of tools, rigging, &c.....	5,000 00
Construction of light draught dredge-boat, with scows, &c.....	10,000 00
Contingencies, including repairs of copper, machine- boat, &c.....	4,000,00
Amount required.....	110,000 00

CHAS. A. FULLER,  
*United States Agent and Engineer.*

## No. 9.

*Colonel Long to Colonel Abert.*

NEW ORLEANS, April 6, 1857.

SIR: In accordance with your instructions of January 10, 1857, I have passed an inspection of the main passes of the mouths of the Mississippi and of the works contemplated for the removal of obstructions to the navigation thereof at and across the tidal bars in the Gulf of Mexico; and I now take leave to present my views in relation to these subjects in the following manner:

The report of the board of engineers, consisting of Captain A. A. Humphreys and the undersigned, organized in 1850 for the purpose of devising the best means of preventing overflows and inundations upon the alluvial grounds traversed by the Mississippi, exhibits clear and correct views of the geographical character and condition of the "mighty river" and its delta formations. To this document, which was submitted to the bureau late in the year above mentioned, I beg leave to refer for any desired information in relation to these topics, especially in so far as relates generally to the geography and hydrography of the valley of the lower Mississippi.

The country at and near the passes of the Mississippi requires a more special description than that given in the report above cited, and now claims attention.

In descending the river from New Orleans, the banks by which it is bounded on both sides gradually become less elevated, while the ground in their rear subsides into flats or swamps nearly on a level with the high water surface of the gulf.

A little below Fort Jackson, at about sixty-eight miles below New Orleans, improvements in the shape of plantations, levees, &c., cease to be presented, and the surface of the ground in all directions assumes a marshy appearance a little above the level of high tide.

Arriving near the common head of the passes, about twenty miles below Fort Jackson, or eighty-eight miles below New Orleans, the river spreads from the width of about one mile to nearly double that width, the flats on either side becoming less elevated and more marshy.

The descent of the river from New Orleans to the Gulf in ordinary low water is about two feet, while in very high water the river overflowing its natural banks, the descent amounts to some fourteen or fifteen feet; hence the current in the former stage has a velocity of about one and a half miles per hour, and in the latter of five to six miles per hour, varying according to the stages of the water.

From this common head the river is divided into three distinct channels or passes, called the Southwest, the South, and the Northeast passes; the first and last mentioned being of nearly equal size and affording facilities for navigation, while the South Pass, once the most favorable for navigation, has become so much reduced in width and depth that vessels drawing only six feet are obstructed in their passage through it. As we descend in all of these passes the grounds on their sides are covered with a rank growth of coarse grass and

rushes, and become less and less elevated, till they present surfaces subject to inundation during the prevalence of high tide."

#### SOUTHWEST PASS.

This pass, as its name imports, has a direction nearly southwest, and reaches the open gulf at the distance of about 17 miles from the head of the passes, or 105 miles below New Orleans. It varies in width from half a mile to nearly a mile, and at its passage over the tidal bar spreads to a much greater width, being divided by intermediate bars into two or three outlets, navigable for craft of 10 to 17 feet draught, across the bar.

For a distance of about one and a half miles across the tidal bar the navigation is restricted to vessels drawing 17 feet water, while the distance through which a channel must be opened, in order to admit the free passage of 20 feet, will embrace an extent of about  $1\frac{1}{2}$  miles.

At the present time vessels drawing 17 feet cross the tidal bar with considerable difficulty, occasionally drawing their keels through soft mud two feet deep at the bottom of the channel.

#### NORTHEAST PASS.

This pass appears to convey off a volume of water much larger than that of the Southwest Pass through a distance of about five and half miles, where it is divided into two distinct channels, one of which retains the name of the Northeast Pass and the other is called the Pas a l'Outre, the former much broader than the latter. The Northeast Pass, thus continued, is divided again into two main subordinate channels called the Northeast and Southeast passes, besides which there are other outlet passes and bayous on both sides of inconsiderable magnitude. The deepest channels of all these passes, in their passage across the bars, nowhere exceed 12 feet.

#### PAS A L'OUTRE.

This branch of the Northeast Pass leads off in a direction about northeast by east, and in a distance of about 9 miles from its head, or 14 $\frac{1}{2}$  miles from the common head of the passes, crosses the tidal bar and enters the gulf. This pass is also attended by numerous outlet channels and bayous, especially on its northerly side, all of inconsiderable size and depth.

The Pas a l'Outre divides itself into two channels of about equal size, called the north and south channels, at the distance of about two and a half miles from the margin of the gulf, presenting between them a swampy tract called the Middle Ground, upon which the new light-house has been erected.

The north channel widens at its mouth as it approaches the gulf, and has a depth of only seven or eight feet of water, while the south channel, in its passage across the tidal bar, has a depth of 15 feet. The distance through which this channel must be opened, in order to afford a depth of 20 feet across the bar, is about two and a half miles.

The depth of the water in the channel across the tidal bar at this time is only about thirteen feet, but vessels drawing fifteen feet can pass the bar with some difficulty, by dragging their keels through soft mud at the bottom, about two feet deep. (With regard to the numerous passes above mentioned, and various others that have not been noticed, there is no doubt that each in its turn has once been the most favorable channel for ship navigation, and it may with equal assurance be predicted that the channels now most favorable for navigation will sooner or later give place to others somewhere else, whose future position cannot now be defined.)

#### NATURE AND CHARACTER OF THE OBSTRUCTIONS.

The tidal bar which now exists and has probably always existed at the mouths of the Mississippi is the main impediment in the way of ship navigation between the river and the gulf. This bar is composed of the alluvious depositions that invariably occur at the points where the fresh water currents of the river meet and are intercepted by the salt waters of the gulf, and extends entirely around the delta formations that constitute the grounds over and through which the river pours its waters into the gulf by its numerous outlets.

The bar at first is composed of recent alluvion in a semi-fluid state, and consisting of particles exceedingly comminuted and unctuous. In time, and by the agency of the gulf billows, it becomes more or less solidified or indurated, and resolves itself into beds and bars, imposing serious impediments in the way of navigation.

From causes hitherto unexplained, portions of the bar of greater or less magnitude, and in innumerable instances, are acted upon by upheaving forces from beneath, and rise vertically in various forms, mostly conical, to the height of several feet above their bases, (the greatest height observed being about 12 feet.)

The cones or mounds thus formed, in the language of the pilots, are called "Mud Lumps," and occur not only at the bottom and sides of the channels across the bar, but on the surface of the swamps, rising in some instances to the height before mentioned above that surface.

The mounds on the swamps present circular orifices at their summits many inches in diameter, and extending vertically downward to a very great but unknown depth. From these orifices are emitted streams of salt water more or less copious, accompanied by ebullitions of inflammable gas.

The submarine upheavings or lumps in the passes are supposed to be analagous in their character and formation to those on the swamps, and in both cases they are supposed to arise and subside more or less frequently as the causes producing them continue operation during periods of greater or less duration.

In some instances they appear to have a permanent existence, while in others they subside to their original level after the lapse of a few weeks, which last is true with respect to all localities removed from the tidal bar.

The lumps in very many places near the tidal bar rise to the surface of high water and become *nuclei*, around which the more recent

deposits of the river accumulate, till at length the swamp lands are formed into delta-shaped islands, and cover the entire areas previously occupied by the lumps at the sides of the outlet channels.

The mud lumps that rise in the channels are covered with a thick coating of fine, adhesive clay, smooth and hard upon the surface, yielding slowly to the action of the strongest currents, and impracticable of removal except by the application of mechanical force; strong iron rakes, harrows or scrapers, dragged across them by steamers, have heretofore proved efficacious in reducing and removing the lumps.

The bars in the deeper channels occasionally contain embedded logs and trees, difficult of removal; but obstacles of this character are far more numerous on the shoals and bars at the sides of the channels.

No formidable snags are presented in connexion with any of the passes.

With respect to the existence of reversed currents or "under tows" of salt water beneath the fresh water volumes or sheets that pass over the tidal bar, and supposed by some to be mainly instrumental in forming the bar, Professor Forshay, late of New Orleans, has shown satisfactorily that no such under tows have any existence at any stage either of flood or ebb tide.

The surveys and investigations made under the direction of Captain A. Talcott have led to results of the highest importance in reference to the character and condition of the passes and to the obstructions in the way of their navigation.

The developments subsequently brought to light in connexion with the coast survey, under the direction of Professor Bache, abound in accurate details in relation to the geography and hydrography of the gulf coast in the vicinity of the passes.

The report of the board of engineers organized by the War Department in 1852, and composed of Captain William R. Latimer, of the navy, and Majors Chase, Barnard and Beauregard, of the corps of engineers, exhibits numerous valuable results derived from instrumental surveys, and abounds in representations and conclusions entitled to the highest consideration.

To the memoirs furnished on these several occasions, I beg leave to refer for more elaborate and reliable information than my opportunities have hitherto enabled me to impart, on the subjects to which my attention has been directed.

#### METHODS OF IMPROVEMENT.

Various projects and devices for the improvement of the outlets of the passes across the tidal bar have been entertained and put forth as the best method of improvement, two of which only have as yet been tested, of which the following are examples, viz.:

1. The process of dredging, and the removal of the materials dredged into the deep waters of the gulf. This process was adopted in 1838 under the direction of Captain Talcott, and prosecuted with doubtful success. The results produced are represented as having had a tendency to form new bars at the outlets, and as having been



injurious rather than beneficial to the navigation across the bar. With the details of the operation I have had no opportunity to become acquainted.

2. An application of large triangular harrows, armed with strong iron teeth or coulter protruding 15 to 18 inches below the timbers of the harrow, or with a strong iron scraper attached to the aft transom of the harrow, was made in 1853 by the Tow Boat Company of New Orleans. This machine was dragged downwards along the bottom of the channel by a powerful steam-tug, and proved efficacious in cutting away the mud lumps and reducing them to a semi-fluid consistency. Thus reduced, the materials of which they were composed were swept by the current into deep water outside of the bar.

This process of removal was at first attempted in the channel inside of or above the bar, and afterwards with better success at the outlets immediately below the bar, and thence upward in the channels by successive soundings of the tug, the operations of the tug and machine on the bottom being invariably in the direction of the current. On every upward return of the tug for a new operation the harrow was raised from the bottom of the channel by means of a derrick or crane, erected on the stern of the tug for that purpose.

No doubts are entertained with respect to the utility and efficiency of this mode of operation. The work of improving the channel across the bar at the Southwest Pass was undertaken and contracted for by leading members of the Tow Boat Company in 1853, and was prosecuted with due diligence in that year. The contract provided for the opening of a channel at least 300 feet wide and 18 feet deep. The work having been finished and duly inspected, payment was made therefor, in accordance with the terms of the contract.

The method devised by Messrs. Craig & Rightor, sanctioned by the War Department, and made the subject of contracts with those gentlemen, now claims attention.

The contracts provide for the opening of a straight channel at least 300 feet wide and 20 feet deep, entirely across the tidal bar, at the outlets of the Southwest Pass and the Pas à l'Outre.

The manner of accomplishing the work consists in the application of pile dams, for the purpose of intercepting the discharge of water through numerous outlets on both sides of the respective passes above mentioned.

In addition to the dams above mentioned, the method of the contractors contemplates the construction of jettys of plank piles on both sides of the Southwest Pass, commencing at points about  $1\frac{1}{2}$  miles above the tidal bar, and extending downward in directions more or less convergent till they arrive at or near the bar, leaving a space of several hundred feet between their lower extremities, the length of the jettys being a mile or more. The volume of water being thus reduced in breadth is expected to move with an accelerated velocity, and sweep the mud lumps, &c., from the channel, and convey them across the bar into the deep waters of the gulf.

With respect to the Pas à l'Outre, the method contemplates the construction of a pile dam about a mile long across the head of the north channel of the pass for the purpose of diverting the flow of



water from the north through the south channel. It moreover contemplates the construction of pile dams and jettys on the southerly side of the Pass for purposes similar to those described in reference to the Southwest Pass.

The efficacy of this method cannot be predicted with any degree of certainty, but must remain for demonstration till the works have been completed according to contract.

### *Progress of the work.*

The operations of Messrs. Craig and Rightor have hitherto been confined to the Southwest Pass. I visited their work on the 27th ultimo, and had the satisfaction to find that they had formed a line of piles in a direction obliquely downward towards the deepest channel across the tidal bar 1,064 feet long; the depth of water along the line varying from four to eight feet. The line consists of a series of posts or piles about one foot square driven vertically into the bottom to the depth of about 25 feet below its surface, and at the distance of about 15 feet apart. Longitudinal strings or streamers, four by eight inches and 30 feet long, are spiked to the upper sides of these posts a little above the surface of the water. The strings serve as guides to the plank piling, which is composed of planks five inches thick at top and two and a half inches thick at bottom, rebated in the manner specified in the patent. The plank piles vary in width from 12 to 20 inches, are driven 10 to 15 into the ground, and fastened by iron spikes to the upper sides of the streamers. The spikes employed for the fastenings are about half an inch square and nine inches long, and the timber of the structure consists of yellow pine and cypress. The line thus formed presents a substantial and well-built structure, is able to withstand a current of about two miles per hour, and is quite impervious to water. On the upper side of the line the depth of water remains as it was before the piles were driven, while on the lower side sedimentary deposits have been made to the depth of four or five inches, the water on this side having become nearly or quite stagnant.

Since the date of the inspection as above, I have been informed that the line has been prolonged more than 500 feet, making the entire length of the line about 1,600 feet. The daily progress in extending the line, the requisite material being at hand, and the weather favorable, is about 150 feet.

In the present state of the work, no reliable conclusions can be drawn with respect to its final efficiency in producing the desired results.

I propose to inspect the work again for the purpose of instituting a system of triangulation and soundings preparatory to a final inspection when the work shall have been completed.

In conclusion, I take leave to offer some of my convictions in regard to the past, present, and future condition of the outlets of the Mississippi, and their susceptibility of improvement.

The history of their navigation acquaints us with the fact that no material changes have taken place in the depths of the channels

across the tidal bars, although their geographical positions have been continually subject to change.

The greatest depths in the channels across the bar have seldom, probably never, exceeded 19 feet. The prevailing greatest depth for the last half century has been limited to 17 or 18 feet, and such is the limit at the present time.

The opening and maintenance of a permanent channel of a depth exceeding this limit are at least very doubtful, if not utterly impracticable, for a duration exceeding a single year. The frequent changes of the channels, the vast accumulations of sedimentary deposits, and the effects produced upon them by the billows of the gulf, forbid the expectation that any permanent benefits can result from any efforts to effect such an object.

In my opinion, the only feasible remedy that can be found for the evils complained of, consists in the application of powerful rakes, harrows or scrapers, propelled by steam power, for the purpose of scalping and reducing the mud lumps as often as they present themselves at the bottom of the deepest channels at the bar.

For this purpose, an annual appropriation of \$100,000 for an indefinite series of years is deemed adequate for its accomplishment. In the mean time the commercial world, so far as it has any connexion with the Mississippi at and below New Orleans, should be notified that vessels drawing more than 17, or at most 18 feet, cannot cross the tidal bar and enter the river without serious hazard to their proprietors.

S. H. LONG,  
*Lieutenant Colonel Topographical Engineers.*

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No. 10.

*Colonel Long to Colonel Abert.*

LOUISVILLE, May 5, 1857.

SIR: In my inspection report of the 6th ultimo I proposed to revisit the work of Messrs. Craig and Rightor, and institute a system of triangulations and soundings for the purpose of testing, according to their contract, the results produced by their operations in furtherance of the fulfilment of their contract stipulations.

Accordingly I repaired to the site of their operations on the 15th ultimo and found them still employed on the line of piles mentioned in my report of the 6th as having been extended about sixteen hundred feet. The further extension of the line had been prevented by a violent *norther* which occurred on the 5th ultimo, and was again repeated, but with less violence, on the 12th of the same month. These storms contributed to break up and derange about one-third of the line previously formed, and left the remaining two-thirds in its original position, though somewhat shattered in places.

The contractors are of the opinion that the catastrophe happened

in consequence of their having used piles of inadequate length in the formation of the lower portion of the line, the depth of water on this portion varying from eight to more than nine feet. In repairing the breach they have adopted piles of a much greater length and driven them much deeper into the bed of the Pass. By applying this remedy, and observing similar precautions on other portions of their work still to be done, they feel sanguine no such disaster will again occur.

The contractors had now two pile-driving boats in operation, one worked by steam, employed in repairing the breach at the lower end of the line, and the other by manual power, at the upper end of the same line. The length of the line as repaired and extended on the 21st ultimo was about the same as heretofore reported, viz: sixteen hundred feet.

I desired of the contractors a designation of the point at which they proposed to cross the tidal bar and enter the open gulf with the new channel; and in reply was informed that they had fixed on no such point, nor did they intend to do so until the changes and currents produced by their work should indicate the best position and direction of the channel in question.

#### TRIANGULATIONS AND SOUNDINGS.

I assumed as a prime base a line 1,000 feet long, carefully measured along the line of piles, the direction being N.  $40^{\circ}$  E. or S.  $40^{\circ}$  W. Signal poles bearing red jacks at their tops were erected at the extremities of this base. At each extremity the angles made by lines drawn to the light-house were carefully observed by the use of a box sextant, graduated, by means of the vernier attached, to minutes of a degree.

The distance from the lower end of the assumed base to the light-house was carefully computed, and assumed as a secondary or main base for all subsequent triangulations.

The triangulation was extended upwards about two and a half miles to the observatory at the pilot's station, on the easterly side of the Pass, and to the telegraph station on the westerly side, and downward to a high pole and signal on an extensive *mud lump* of some fifty or sixty acres, called Stake island; also to a large metallic buoy, called the can buoy, situated at the bifurcation of two distinct main channels leading across the tidal bar, through one or the other of which all vessels entering or leaving the Pass must be conveyed.

In addition to the points of triangulation above mentioned, four other points were established and marked by signal poles, surmounted by red flags or jacks, set in mud lumps, rising some eight to ten feet above the surface of the water, and presenting areas varying from about one-eighth to three-fourths of an acre, respectively.

Two of these signals were located at the distance of about two miles apart, on a line crossing all the channels of the Pass, nearly at right angles with the general direction of the currents of the Pass, and about one mile below the lower extremity of the primary base.

The other two signals were placed at the distance of about two and a half miles apart, on a line nearly parallel to that of the two signals

just before mentioned, and at the distance of about three-quarters of a mile below them.

The line last mentioned is nearly coincident in position and direction with those of the crest of the tidal bar, and crosses the main navigable channels leading across the bar.

The selection of the four points indicated as above was made in conformity to the presentation of suitable mud lumps rising above the surface of the water in positions most favorable for lines of soundings, leading across all the channels intended to be affected by the work of Messrs. Craig & Rightor in the Southwest Pass.

The position and extent of the several lines having been determined, soundings are to be made and repeated as often, at least, as once a week on all the lines leading across the channels, for the purpose of showing any changes that may take place in the positions, widths, and depths of the channels.

The manner provided for taking and applying the lines to be sounded provides for the casting of the lead at stated intervals of time, (viz: once in every minute or half minute,) and for noting the depth at every sounding in feet and parts.

With the data thus obtained, (the length of the lines having been previously determined,) a submarine section on each line sounded is to be prepared and delineated, the line sounded being regarded as the base, and the depths of soundings as ordinates, depending therefrom at equal distances asunder, corresponding to the number of soundings made along the line. A waved line, drawn through the lower extremities of the ordinates, will show the inequalities of the bed of the Pass, its channel, &c., at the time and place of each set of soundings.

This operation, being repeated once a week on every line proper to be sounded, and corresponding delineations being prepared therefor on every occasion of sounding, will clearly exhibit the nature and extent of the changes that occur from week to week in the depths and positions of the channels.

The operations detailed as above, contemplate the preparation of a sectional diagram for each set of observations, the diagrams being numbered 1, 2, 3, 4, &c., in the order of the preparation, for each line of the triangulation upon which the sounding may have been made, each series of diagrams being referred to its appropriate line of soundings, as marked and designated on the plot of triangulations.

In accordance with the foregoing representations, instructions have been furnished to Wm. Johnson, esq., who has been employed to direct and supervise the operations above considered; a copy of which instructions is as follows:

“SOUTHWEST PASS, *April* 18, 1857.

“SIR: You are desired to remain in the supervision of the operations of Messrs. Craig and Rightor, and of the results produced thereby so far as they relate to the accomplishment of the objects specified in their contract for the removal of obstructions from this Pass.

“In the discharge of the duties claiming your attention you will observe the following details, viz:

“1st. You will make such observations as are necessary to test the

accuracy of the triangulations already made by us conjointly, carefully rectifying such errors as may be detected therein.

"2d. You will repeat the soundings already made on the several lines sounded by us, and continue the repetition as often at least as once every week, the weather permitting.

"3d. You will plot each line of soundings as above, and all other lines of soundings you may find occasion to make, in the manner explained to you, viz: in separate slips of paper, designated and numbered as directed. The plot of each line will be attended by ordinates, depths, and a waving line, indicating the variable depths of the river channel, after the manner exemplified in our late drawings.

"4th. In all your soundings you will ascertain, as nearly as practicable, the elevation of the surface water above ordinary low water at the time of sounding, and make due allowance therefor in the depth of the soundings.

"5th. You will establish one or more bench-marks on a level of ordinary low water, in the following manner, viz: Fix one or more tide-gauges at suitable points; assume a point about an inch below extreme low water and mark it with 0 or zero; divide the gauge-rod into inches and quarters and number the inches, from zero downward, 1, 2, 3, 4, &c.; observe and note the inches and parts on the rod at extreme ebb tide daily for one entire lunation; add the recorded observations together for one lunation and divide their sum by the number of observations, and the quotient will indicate the bench-mark level for the lunation.

"Repeat the observations during a series of lunations, and divide the sum of the series (for one year if practicable, or six months if otherwise,) by the number of the series, and the quotient will indicate the true level of the bench-mark, which may be fixed by driving a stake at the margin of the water at that level till the head of the stake coincides exactly with the surface of the water.

"6th. Keep a daily register of the observations made upon the tide gauge, from which the level of the bench-mark (or ordinary low water,) may be deduced with accuracy.

"7th. Keep a diary of all your proceedings relating to the triangulations, soundings, tidal observations, &c., &c., prepared with neatness and accuracy, to be submitted in the form of "field notes" at the expiration of your period of service.

"8th. You are desired to report in general terms your proceedings in all respects as often as once in a month, on or about the end of every month, by letters, to my address at Louisville, Kentucky, unless otherwise directed.

"9th. Whenever Messrs. Craig & Rightor shall give notice that their work in the Southwest Pass is ready for final inspection (or fix the date at which it will be ready for final inspection,) you are desired to apprise me thereof by telegraphic despatch if the result of your previous observations and surveys should render it certain or highly probable that the work is actually ready, or will be ready for final inspection according to contract.

"10th. It is understood that the work will be ready for final inspection when a straight channel, 300 feet wide and 20 feet deep, clear of

all obstructions, shall have been formed entirely across the tidal bar, from the secondary base surveyed by us to the open gulf.

"11th. In general you are desired to ascertain and report all perceptible changes in the bed of the Pass below the secondary base above mentioned, and especially in the positions, widths, and depths of the channels below that line.

"12th. You are authorized to purchase such articles of stationery, and to hire such boats, hands, tools, &c., as are necessary to the performance of the duties assigned you, with the understanding that vouchers duly executed in duplicates must be taken and rendered for all such expenditures.

"13th. Preparations having been made for the adjustment of all accounts likely to be incurred during the current quarter, you are desired to forward to the undersigned monthly estimates for each month of the succeeding quarter, in order that proper remittances may be forwarded for defraying the expenses of each month of the quarter last mentioned, (third quarter of 1857.)

"14th. Your attention is particularly requested to the observance of each and every item of the foregoing instructions, by means of which I shall be kept adequately apprised of the progress of the work committed to your supervision.

"In conclusion, I would observe that your experience as an engineer, and your familiarity with nautical affairs, inspire the belief that you will be able to discharge the duties confided to your charge in a manner creditable to yourself and beneficial to the public service.

"Respectfully, sir, your obedient servant,

"S. H. LONG,

"Lieutenant Colonel T. E.

"Captain Wm. JOHNSON, *Southwest Pass.*"

Having accomplished my inspections, triangulations, and other arrangements, as above, I communicated the following notice to Messrs. Craig & Rightor, the contractors for the improvement of the Southwest Pass :

"SOUTHWEST PASS, *April 20, 1857.*

"GENTLEMEN : The bearer, Captain Wm. Johnson, having been employed to inspect your work for the improvement of the Southwest Pass, and to report its progress, and the effects produced thereby, in so far as relates to the removal of obstructions from the main navigable channel and to the formation of a new channel, 300 feet wide and 20 feet deep, as stipulated by contract, you are desired to receive him in the capacity above intimated during my absence, and to regard him as my agent and representative in all matters relating to the fulfilment of your contract till I return again to the Pass.

"Whenever the work shall have been so far advanced as to enable you with certainty, and to the satisfaction of Captain Johnson, to fix a date at which it will be ready for final inspection and acceptance, agreeably to the contract, you are desired to apprise him of such date, that I may be seasonably notified thereof by him and return again to



this place for a personal inspection and acceptance of the work, if executed in conformity to the terms of the contract.

" Respectfully, gentlemen, your obedient servant,

" S. H. LONG,

" Lt. Col. Corps Top. Engs.

" Messrs. CRAIG & RIGHTOR,

" Contractors, Southwest Pass."

In conclusion, I take leave to present a further exposition of my views in relation to the formation and character of the tidal bar, and, for this purpose, shall adopt the following hypothesis, based on the present aspect of things and upon occurrences known to have taken place in former times.

The tidal bar is known to be composed of sedimentary matter brought down and deposited by the waters of the Mississippi, and consisting of earthy and vegetable materials, exceedingly comminuted, unctuous, and adhesive.

The points at which the most copious depositions have been made are those at which the currents of the river are merged into the still waters of the gulf. The deposits brought down in each successive year are made in advance of those of the preceding year, thus contributing to the annual advancement of the tidal bar into the gulf.

The deposits, when first made, as before intimated, are fine, unctuous, and impalpable, and constitute a semi-liquid mass of earthy, mineral, and vegetable particles, which, when brought into contact and combination with the salt water of the gulf, are subjected to chemical and mechanical changes, the former of which have never been adequately investigated or explained.

With respect to the mechanical changes, or those produced by the combined agency of the river currents and gulf billows, they may be accounted for in part, if not altogether, in the following manner :

The annual amount of deposit is distributed along the outer margin of the tidal bar in accumulations more or less abundant, according to the quantities of fresh muddy water conveyed across the crest line of the bar at or near the points of deposition.

The deposits having been made, the gulf billows begin to exercise a mechanical action upon them, which results in the formation of a crust or indurated covering upon their surface, which continues to increase in thickness and solidity till, at length, the covering of the mass becomes firm and unyielding, and, at the same time, impervious to the gasses that are formed by the decomposition of the vegetable matter contained in the mass of deposits confined beneath the crust or covering.

In this way annual deposits, accumulations, &c., are constantly occurring, in proof of which, borings through the alluvial formations of the Mississippi delta, from its surface to great depths below, have developed a succession of stratifications of mud and indurated clay of different degrees of hardness, alternating with each other to the full extent hitherto penetrated.

The decomposition of the vegetable matter probably occurs annually, or, perhaps, less frequently after the subsidence of the spring



and summer floods of the Mississippi, when the waters, &c., adjacent to the gulf shall have been brought to such a degree of temperature as is necessary to produce fermentation and putrefaction. At this and all higher degrees of temperature the process of decomposition is carried on more or less rapidly, attended by the production of gasses, which, in combination with the soft mud overlaid by the crust or indurated covering before mentioned, gives to the underlying mass a specific gravity materially less than that of the water, deposits, &c., lying above the crust. Hence the crust must yield at its weaker or thinner points, an uprising of the same ensues, and those hitherto anomalous productions called "mud lumps" ensue.

The uprising of the indurated covering continues until the coverings crack open at their highest points, and the gasses gradually escape through the fissures, carrying with them small streams of water, exceedingly turbid, and of saline and bitter taste. The gasses thus escaping are invariably inflammable, like the bubbles arising from the bottoms of fens or stagnant pools.

The numerous mud lumps that have come under my personal observation have invariably presented a covering of stiff adhesive clay, rent and divided by fissures on almost every portion of their surface. They assume all possible forms; those of the smaller dimensions being somewhat conical in their form, while those of the larger sizes present themselves in the shapes of ridges, some of them nearly straight, while others are curved and recurved, presenting very irregular and ragged outlines. Some of them present orifices like craters, through which the gasses and salt springs escape, while others present no other openings but prolonged fissures, through which their imprisoned air, mud, and water are set at liberty.

It is true of almost every mud lump, however minute or spacious, and whether above or below the surface, that a pole or stake driven through their indurated covering, enters into a soft yielding mud, and may readily be thrust downwards to a great depth with very little resistance.

Mud lumps of the character above described are nowhere to be met with except in the vicinity of the inner margin of the tidal bar, of which last, as also of the swamps in its rear, they constitute not only the substratum, but the entire superstructure of mud, &c., erected thereon.

S. H. LONG,  
*Lieutenant Colonel Topographical Engineers.*

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No. 11.

*Colonel Long to Colonel Abert.*

LOUISVILLE, June 20, 1857.

SIR: Sundry letters have been received from Captain Wm. Johnson in relation to the operations of Messrs. Craig & Rightor at the Southwest Pass, and to the changes produced hereby in the channels

across the tidal bar during the month of May last. Hence it appears that early in that month a strong gale from the southeast prevailed for several days, and contributed to the rupture of the upper portion of the line of piles, through a distance of about 800 feet; also, that at the end of the month the rupture had been repaired, and that the contractors continued sanguine in the belief that their enterprise would be crowned with ultimate success.

At the date last mentioned, (May 31,) the contractors had succeeded in repairing all defects in the line of piles, and in extending the same to an aggregate length of about 3,000 feet. The work thus extended remained stable and unaffected by storms at that date; no violent gales having occurred since the protracted gale above noticed.

From the observations of Captain Johnson, it also appears that no perceptible changes have been produced in the bed of the Pass, except a slightly accelerated current along the upper side of the line of piles, the depths of the soundings across the Pass, as also in the channels across the tidal bar remaining unchanged.

Captain Johnson has been directed to continue his observations in the manner prescribed in my instructions of the 18th of April last, a copy of which has been sent to the bureau, and to keep me apprised of the results produced by the operations of the contractors, while I hold myself in readiness to revisit the work whenever it shall appear that the contractors shall have got it ready for final inspection.

In addition to the documentary information received from and through the bureau on the subject of the passes, I have succeeded in obtaining the manuscript reports of Captain Talcott, and his associates, Messrs. Lidell & Meade, on the same subject, and have caused the same to be entered among the records appertaining to the improvement of the mouths of the Mississippi.

S. H. LONG,  
*Lieutenant Colonel Topographical Engineers.*

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No. 12.

*Colonel Long to Colonel Abert.*

LOUISVILLE, July 30, 1857.

SIR: Agreeably to a report of Captain Johnson, received on the 28th instant, it appears that the operations of Messrs. Craig & Rightor at the Southwest Pass, during the month of June last, have been attended with serious discouragements and doubtful success. The line of piles has been extended southwestwardly only about 300 feet during the month, while the line, through a distance of about 100 feet of its northeastern portion, has been disrupted and driven from its moorings.

Hence the extent of the line still remaining on the 30th June is only about 3,200 feet, while as yet it appears that nothing had been done towards the formation of a counter line of piles on the north-westerly side of the Pass.

Boisterous weather had prevailed during most of the month, by which not only the progress of the work had been much retarded, but some four or five of the signals for the triangulations had been carried away.

With respect to the improvement of the channel, no favorable changes are yet perceptible, and doubts are still entertained as to the efficiency of the mode of improvement adopted by the contractors under the sanction of the War Department.

S. H. LONG,  
*Lieutenant Colonel Topographical Engineers.*

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No. 13.

*Colonel Long to Colonel Abert.*

LOUISVILLE, August 20, 1857.

SIR: Agreeably to a report of Captain Johnson, dated on the 31st ultimo and this day received, it appears that the work of Messrs. Craig & Rightor had advanced rather tardily during the month of July last, and that the benefits resulting from it continued doubtful at that date.

The line of piles had been prolonged southwestwardly towards the tidal bar, with a deflection of about five degrees to the right, through a distance of about 1,100 feet, making the entire length formed at the close of the month about 4,300 feet.

From the soundings on the lines of the triangulations it does not appear that either the depth or width of the main navigable channels has been increased in consequence of the work that has been done under the contract, except in so far as relates to a perceptible divergence of the outflows of the water across the tidal bar from the left to the right or northward, which appears to have been occasioned by the line of piles.

The weather appears to have been less boisterous and more favorable for the prosecution of the work during the month of July than it had been during the preceding month.

S. H. LONG.

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No. 14.

*M. P. Breckinridge to Col. Long.*

LOUISVILLE, September 1, 1857.

SIR: In compliance with your order of August 12th, enclosing a copy of the queries from the topographical bureau of April 24, 1856, and other papers, requiring of me a report upon western commerce and the steamboat disasters of the western rivers for the fiscal year

ending on the 30th of June last, I submit the following, premising that, in consequence of the short time allowed me, it is necessarily incomplete in many respects. A report embracing detailed information in regard to the commerce of the western rivers, canals, and railroads, would be a work of great time and labor, and would give one person constant employment in collecting the requisite material. In the course of my inquiries, in addition to the information obtained at this point, I visited Cincinnati and St. Louis for the purpose of gathering such statistics as could be had in furtherance of the object in view. The commerce of these three cities, though a comparatively small item in the whole, and detailed in a very imperfect manner in this paper, will convey some idea of the extent of western trade.

From the published proceedings of the fifth annual meeting of the board of "supervising inspectors" of steam vessels, I extract the following information in regard to the number of steamboats inspected, and their tonnage, for the year ending October 1, 1856:

	No. of steamers to which certificates of inspection had been granted.	Amount of tonnage of steamers inspected.
St. Louis .....	109	33,886
Louisville .....	62	23,405
Nashville .....	27	5,311
Pittsburg .....	85	19,905
Wheeling .....	34	5,041
Cincinnati .....	47	13,595
Total .....	364	101,643

The subjoined table, showing the amount of receipts of a few of the principal articles of trade at Louisville, is compiled from an annual commercial report in the Louisville Courier. The amounts would have been much larger if any accurate accounts of the receipts by wagon had been kept.

	Bbls. flour.	Sacks wh't.	Sacks corn.	Bbls. whiskey.	Pieces bagging.	Bags coffee.
By river .....	11,788	24,013	92,581	66,605	12,749	36,172
By railroad .....	29,692	91,694	88,802	23,891	27,778	4,035
By wagon .....	190,000	-----	-----	-----	-----	-----
Total .....	231,470	115,707	131,383	90,496	40,527	40,207

I am indebted to Mr. W. N. Haldeman, collector of the port, for the following table of the monthly duties collected at the custom-house, and for the number of steamboats registered and their tonnage.

*Duties received during the year ending June 30, 1857.*

		Brought up-----	
1856, July-----		1857, January-----	\$4,918 38
August-----	\$1,036 88	February-----	967 78
September-----	837 70	March-----	1,053 64
October-----	510 00	April-----	3,508 10
November-----	859 40	May-----	378 00
December-----	1,674 40	June-----	915 41
	4,918 38		663 60
			12,404 91

The total number of steam-vessels registered at the port of Louisville for the same year is 85; number of tons burden 26,594.65; showing an average capacity to each boat of 301.11 tons. A moderate average for the cost of these boats would be \$25,000 each, giving the sum of \$2,125,000 of capital invested in steamboats. There are also numerous barges and keel-boats used in carrying freights up and down the river; and besides these many flat-boats descend the Ohio to Louisville annually, laden with coal, lumber, and other products. Of the number of these and the value of their cargoes I am unable to give a very correct estimate, but they are probably not less than two hundred, with an average value of \$500.

For the subjoined statement of duties collected at the Cincinnati custom-house for the fiscal year I am indebted to Mr. R. T. Reilly, deputy collector of the port.

		Brought up-----	
1856, July-----	\$11,972 30	1857, January-----	\$46,635 73
August-----	8,834 04	February-----	6,750 80
September-----	3,779 55	March-----	4,719 09
October-----	14,809 44	April-----	2,832 49
November-----	1,375 20	May-----	5,210 20
December-----	5,865 20	June-----	9,753 00
	46,635 73		3,382 65
			79,283 96

The annexed statements in regard to the commerce, &c., of the Ohio river at Cincinnati, and the imports and exports by railroads, canals, and river, were kindly furnished by Mr. Wm. Smith, superintendent of the Merchants' Exchange.

*Number, tonnage, and cost of steam and other vessels at Cincinnati.*

	No.	Tonnage.	Cost.
Steamboats-----	137	34,613	\$2,969,172
Barges-----	361	89,650	211,000
Flatboats-----	760	36,000	42,000
Total-----	1,258	160,263	3,222,172

Giving as the average:

	Tonnage.	Cost.
Steamboats .....	254	\$21,670
Flatboats .....	47	55
Barges .....	248	585

The number of arrivals of steamers at Cincinnati for the year was 2,509.

*Tonnage and value of commerce of Cincinnati for fiscal year.*

	Imports.		Exports.		Total.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.
By river .....	713,346	\$67,310,102	449,630	\$50,322,160	1,162,976	\$117,632,262
By canals .....	82,284	7,886,134	24,360	2,870,149	106,644	10,756,283
By railroads .....	91,360	9,785,321	54,120	5,102,640	145,480	14,887,961
Total .....	886,990	84,981,557	528,110	58,294,949	1,415,100	143,276,506

Comparing this with a similar table for the preceding fiscal year, there will be found an increase of a little over 2 per cent. in the tonnage by river, and of about 17 per cent. by railroad, while there is a decrease of about 15 per cent. by canals.

In addition to the above, there arrived at Cincinnati in flat-boats:

Bushels of coal.....	16,000,000	Value.....	\$1,600,000
Feet of boards .....	110,000,000	do. ....	1,650,000
Tons of produce .....	44,000	do. ....	3,500,000
			6,750,000
Add value of imports before given.....			84,981,557
Total.....			91,731,557

For the subjoined statement of the dutiable value of imports and duties collected thereon at St. Louis I am indebted to Captain W. A. Linn, collector of that port, whose kindness I wish particularly to acknowledge, not only in furnishing all the information in his own power, but in putting himself to much personal inconvenience assisting me in collecting it elsewhere:

Dutiable value of imports.....	\$1,123,478 36
Duties collected.....	359,754 20

Amount of tonnage of steam vessels enrolled at the port of St. Louis June 30, 1857.....	44,846 tons.
Amount of tonnage of vessels, other than steam, en- rolled as above, canal boats, barges, &c.....	5,771 "
	<u>50,617 "</u>

The number of steamboat arrivals for the year, as kindly furnished by Mr. John Durack; harbor master, is.....	3,107
This does not include the packets to Keokuk, Chester, and Alton, whose average the year round would be fully 75 per month, or.....	900
Total arrivals .....	<u>4,007</u>

According to Mr. Durack, there arrived during the year in St. Louis, from ports above, 300 barges, of an average of 100 tons burden, and 120 canal boats of 85 tons each, laden principally with grain and lumber.

The table below, which is compiled from a pamphlet entitled "An Annual Review of the Commerce of St. Louis," published at the office of the "Missouri Republican," shows the amount of receipts of some of the principle articles of commerce for the year 1856.

	Bbls. flour.	Sacks wheat.	Sacks corn.	Bbls. whisk.	Sacks oats.	Pigs lead.
By railroad....	95, 106	191, 295	77, 659	10, 407	57, 783	14, 628
By river.....	278, 654	1, 697, 089	460, 273	95, 831	458, 176	204, 656
By, wagon....	119, 555	89, 432	-----	26, 412	-----	-----
	493, 315	1, 977, 816	546, 932	132, 640	515, 959	219, 284

The following is believed to be a reliable statement of the navigable lengths of the principal western rivers. As before stated, to give an accurate yearly estimate in detail of the amount and value of the tonnage and commerce of these rivers would, probably, occupy the undivided attention of a single individual.

*Navigable lengths of western rivers.*

Mississippi river.....	2,200 miles.
Missouri river.....	2,000 "
Red river.....	1,100 "
Ohio river.....	980 "
Arkansas river.....	600 "
Tennessee river.....	480 "
Illinois river.....	304 "
Wabash river.....	300 "
Alleghany river .....	250 "



Cumberland river.....	200 miles,
Monongahela river.....	130 "
Wisconsin river.....	100 "
Kentucky river.....	75 "

Making an aggregate length of 8,719 miles. Besides which there are many other streams of greater or less navigable length, constituting in all a distance upon the western waters susceptible of steam navigation of not less than 12,000 miles.

The subjoined tables exhibit sundry lines of conveyance by rivers and canals, in navigable stages, and by railroads, when passable; and show the distances between commercial points, the duration of transit from point to point, and the average charge for conveyance of freights per ton net, and of passengers per individual through these distances—the charge for the latter covering personal transportation only.

## RAILROADS.

Through routes.	Through distances in miles.	Through transportation of freight and passengers.					
		Duration for freights.	Charges per ton net.	Duration for passengers.	Charge per individual.		
		Hours.	min.		Hours.	min.	
Louisville, via Jeffersonville, to Michigan city.....	261	24	0	\$11 75	11	25	\$7 00
Do.....do.....Detroit.....	486	44	0	22 00	21	15	13 00
Do.....do.....Chicago.....	318	30	0	14 40	16	0	8 50
Do.....do.....St. Louis.....	300	27	30	12 00	16	0	8 50
Louisville, via New Albany, to Michigan city.....	288	26	0	12 00	13	0	7 00
Do.....do.....Detroit.....	516	48	0	23 00	22	30	14 00
Do.....do.....Chicago.....	343	31	0	15 00	15	0	8 50
Do.....do.....St. Louis.....	274	24	0	10 50	14	0	8 00
Louisville, via Seymour, to Cincinnati.....	137	12	0	8 00	7	0	3 00
Cincinnati, via Indianapolis, to Michigan city.....	263	24	0	11 00	11	30	7 00
Do.....do.....Chicago.....	320	30	0	14 50	15	0	8 50
Cincinnati, via Vincennes, to St. Louis.....	342	30	0	11 00	16	0	10 00
Cincinnati to Sandusky.....	218	18	0	4 50	8	0	6 00
Cincinnati to Cleveland.....	254	20	0	4 50	10	0	6 00
Cincinnati, via Cleveland, to Buffalo.....	484	44	0	7 00	22	0	14 00
Cincinnati, via Crestline, to Pittsburg.....	367	36	0	6 50	15	0	9 00
Cincinnati, via Steubenville, to Pittsburg.....	337	33	0	6 50	13	30	9 00
St. Louis to Jefferson city.....	125	10	0	7 00	6	0	5 00
St. Louis to Chicago.....	285	24	0	12 00	12	0	8 00
St. Louis to Detroit.....	539	50	0	22 00	24	0	16 00
Cairo to Chicago.....	365	32	0	14 00	19	0	12 00
Cairo to Cincinnati.....	390	37	0	15 00	22	0	12 00

RIVERS.

Through routes.	Through distances in miles.	Through transportation of freight and passengers.		
		Duration of journey.	Charge per ton net for freight.	Charge per individual.
		<i>Days. hours.</i>		
Louisville to New Orleans .....	1,400	6 12	\$6 00	\$5 00
St. Louis .....	580	2 12	6 00	3 00
Pittsburg .....	618	5 0	6 00	3 00
Cincinnati .....	160	17	3 00	1 00
Wheeling .....	523	4 0	3 50	2 00
St. Louis to New Orleans .....	1,300	6 12	6 00	5 00
St. Paul .....	692	5 0	10 00	5 00
Fort Leavenworth .....	479	5 0	12 00	5 00
La Salle .....	290	3 0	5 00	2 00
New Orleans to Shreveport .....	650	4 0	5 00	5 00
Vicksburg .....	400	2 12	3 00	2 00
Napoleon .....	586	3 12	4 00	3 00
Cairo .....	991	5 0	5 00	4 00
Fort Towson .....	960	7 0	10 00	8 00
Fort Gibson .....	1,208	8 0	12 00	8 00
Cairo to Fort Gibson .....	1,027	7 0	10 00	8 00
St. Louis .....	180	1 0	3 00	1 00
Fort Leavenworth .....	659	6 0	13 00	6 00
La Salle .....	470	4 0	6 00	5 00
Keokuk .....	375	3 12	5 00	3 00
Dubuque .....	622	5 0	7 00	4 00
St. Paul .....	872	6 0	12 00	6 00
Tuscumbia .....	325	2 0	5 00	3 00
Nashville .....	263	1 12	5 00	2 00
Louisville .....	400	2 0	5 00	2 50
Cincinnati .....	560	3 0	6 00	3 00
Portsmouth .....	643	4 0	6 00	3 00
Wheeling .....	911	5 12	7 00	4 00
Pittsburg .....	1,005	6 0	7 00	5 00

CANALS.

Through routes.	Through distance in miles.	Through transportation of freight.	
		Duration of journey.	Charge per ton net for freight.
		<i>Days. hours.</i>	
Beaver to Erie, Pa. ....	137	2 8	\$3 75
Portsmouth to Cleveland .....	306	5 0	7 50
Cincinnati to Toledo .....	236?	4 0	6 00
Evansville to Toledo .....	387?	6 12	9 50
LaFayette to Toledo .....	187	3 0	4 50
La Salle to Chicago .....	100	1 16	2 50

The statements in the foregoing tables may be regarded as nearly correct, so far as they relate to distances; but, in all other respects, and especially in relation to the duration of transits and the charges for conveyance, they are to be regarded merely as average results—the stages of water, the state of the weather, and the season of the year being favorable in all cases for transportation. Moreover, in so far as relates to the conveyance of troops, the average charges in all cases may no doubt be materially reduced according to the number or magnitude of the force to be conveyed.

## STEAMBOAT DISASTERS.

For the following list of steamboat accidents occurring during the year ending on the 30th of June, 1857, I am indebted in part to the pamphlet before quoted, from the office of the Missouri Republican, partly to Captain Davis Embree, supervising inspector of steamboats of the 5th district, and partly to Captain John Shallcross, supervising inspector of the 6th district.

Date.	Name of boat.	Nature of accident, &c.
1856.		
July 1	St. Clair.....	Burnt at St. Louis. Loss \$15,000.
1	Grand Turk.....	Burnt at St. Louis. Loss \$17,000.
1	J. M. Stockwell.....	Burnt at St. Louis. Loss \$15,000.
1	Paul Anderson.....	Burnt at St. Louis.
1	Saranak.....	Do.
1	Southerner.....	Burnt at St. Louis. Loss \$60,000.
6	E. A. Ogden.....	Sunk in Missouri river. Afterwards raised.
10	Envoy.....	Sunk in Mississippi river. Loss \$10,000.
11	Annawan.....	Burnt at Cincinnati. Total loss.
14	Thomas H. Lawkin.....	Burnt in Mississippi river. Total loss.
20	Greek Slave.....	Sunk in Mississippi river. Afterwards raised.
25	D. G. Taylor.....	Sunk in Missouri river. Afterwards raised.
Aug. 1	David Gibson.....	Sunk in Mississippi river. Afterwards raised.
10	Arabia.....	Sunk in Missouri river. Loss \$16,000.
Sept. 5	Avondale.....	Sunk in Mississippi river. Afterwards raised.
14	Audubon.....	Do. do.
20	Westerner.....	Sunk in Mississippi river. Loss \$40,000.
26	Empire.....	Sunk in Mississippi river. Afterwards raised.
25	Alhambra.....	Do. do.
20	Royal Arch.....	Do. do.
22	Grapeshot.....	Sunk in Ohio river. Afterwards raised.
22	Cuba.....	Sunk in Ohio river.
22	Julia Dean.....	Sunk in Ohio river. Afterwards raised.
30	Genoa.....	Sunk in Missouri river. Loss \$20,000.
Oct. 5	R. M. Jones.....	Sunk in Red river.
7	Florida.....	Snagged in Mississippi. Cargo damaged.
8	Midas.....	Snagged in Mississippi.
10	David Tatum.....	Sunk in Missouri river. Afterwards raised.
20	Creole.....	Sunk in Mississippi river. Loss \$12,000.
25	Lady Franklin.....	Sunk in Mississippi river. Afterwards raised.
Nov. 1	Linden.....	Sunk in Red river. Loss \$7,000.
20	Emma.....	Sunk in Ohio river. Afterwards raised.
21	Keystone.....	Sunk in Missouri river. Afterwards raised.
23	Chancellor.....	Sunk in Ohio river. Afterwards raised.
Dec. 1	Defiance.....	Sunk in Muskingum river. Total loss.
5	Delaware.....	Collision with Eclipse. Considerably damaged.

STEAMBOAT DISASTERS—Continued.

Date.	Name of boat.	Nature of accident, &c.
1856.		
Dec. 6	R. F. Sass .....	Collision with Metropolis. Slightly damaged.
6	Metropolis .....	Collision with R. F. Sass. Slightly damaged.
10	Clara Fisher .....	Sunk in Alleghany river.
23	Altamont .....	Sunk in Ohio river. Total loss.
26	Louisa .....	Sunk in White river. Loss \$12,000.
1857.		
Jan. 16	Navigator .....	Sunk in Ohio river.
20	Niagara .....	Lost by ice in Mississippi river.
28	J. M. Converse .....	Sunk in Mississippi river. Loss \$35,000.
Feb. 4	Submarine No. 5 .....	Sunk in Mississippi river. Loss \$8,000.
5	Grace Darling .....	Sunk in Mississippi river, by ice. Loss \$20,000.
7	Vienna .....	Sunk in Illinois river, by ice. Loss \$12,000.
9	Emma Harmon .....	Sunk in Illinois river.
14	Americus .....	Sunk in Mississippi river.
20	{ Belfast .....	Collision at Ozark island; 25 lives lost.
	{ Humboldt .....	
Mar. 19	Belfast .....	Grounded at island 66. Much injured.
24	Amazon .....	Sunk in Missouri river.
24	A. L. Shotwell .....	Sunk in Mississippi river.
25	Euclare .....	Sunk at Merrimac. Collision with South America.
27	Grapeshot .....	Sunk in Ohio river by collision with Governor Powell. Loss, \$2,500. Raised.
April 1	Forest Rose .....	Exploded at Napoleon; 13 lives lost.
26	Julia Dean .....	Sunk by collision with Rainbow in Ohio river; 5 lives lost.
27	A. C. Gordon .....	Sunk in Missouri river.
May 16	J. P. Tweed .....	Sunk in Ohio river. Loss \$3,000.
June 9	Alida .....	Sunk in Ohio river by collision with Fashion. Loss \$4,000.
12	Star of the West .....	Sunk in Missouri river.
17	U. S. Mail .....	Sunk in Missouri river. Total loss.

RECAPITULATION.

Total number of accidents 63.

Sunk .....	40	Grounded .....	1
Burnt .....	8	Exploded .....	1
Collisions .....	8		
Lost by ice .....	3		63
Snagged, but not sunk .....	2		

The accidents happened in the different rivers as follows :

Mississippi .....	31	Alleghany .....	1
Ohio .....	14	White .....	1
Missouri .....	10	Arkansas .....	1
Red river .....	2		
Illinois .....	2		63
Muskingum .....	1		

Total number of lives lost, 43.

M. P. BRECKINRIDGE.

## APPENDIX D.

WILMINGTON, N. C., *September 1, 1857.*

SIR: I have the honor to submit the usual annual report required by the regulations. By special order No. 160, dated War Department, Adjutant General's Office, Washington, December 11, 1856, I was assigned to the charge of the improvements of Cape Fear river, and for reopening a communication between Albemarle sound and the Atlantic ocean.

The subject of reopening Roanoke inlet has been reported upon by several engineers of distinction: first, by Mr. Fulton, an English engineer, employed by the State of North Carolina, in 1820; second, by Captain Bache, topographical engineers, in 1829; third, by Mr. Gwyn, a well known civil engineer, employed by the State of North Carolina; and, fourth, by Lieutenant Woodbury, of the corps of engineers, in 1853, all of whom agree in the necessity of building dams across Croatan sound, which, according to Lieutenant Woodbury's report, is "three miles over, and averaging 8 feet deep, with a greatest depth of 13 feet;" another communication. "east of Roanoke island, called Roanoke Sound, with a principal channel one half mile over, and averaging 4 feet deep, and several smaller channels above three-fourths of a mile over and 1 foot deep;" in addition to which are the marshes, 18 inches above ordinary level, one and three-quarter mile, making the dam seven miles in length, for which the item of stone, alone, is estimated by Mr. Fulton at \$2,450,000.

Lieutenant Woodbury proposes, first, to excavate a channel 150' wide commencing at 6 feet water in the sound, and continuing to the sand banks, for which he estimates \$105,500; he then proposes to cut a canal 900 yards in length, 150 yards wide, and 6 feet deep, from the sound to the ocean, for which he estimates \$40,500; the ocean end of the canal to be protected by piers of masonry extending, respectively, one-half and one-quarter of a mile into the sea, the estimate for which is \$500,000, which makes in all \$646,000, which, added to the estimate of Mr. Fulton, for the item of stone alone, makes \$3,096,000, to which must be added other items of material, machinery, labor, contingencies, &c., which would, in my opinion, swell the estimate to \$5,000,000.

Congress appropriated \$50,000 to commence the operation. \$40,000 have been expended, and at this time there is scarcely a trace to be seen of what has been done, the drifting sand filling in the trench as fast as it was excavated by the dredging machine. In fact, the machine was very near being imbedded in the sand, it filling in so rapidly behind it; but it was gotten out in time to save it. On my first visit to Nag's Head, in company with Lieut. Whiting, of the corps of engineers, previously in charge of the work, I was perfectly satisfied of the entire impracticability of the scheme, and in consequence reported to the bureau, recommending that the work should be abandoned, and the machinery and other public property sold, which report was approved of by the honorable Secretary of War, and the property was sold on the 15th of August. On reference to the

correspondence on this subject, on file in the office here, I find that Lieut. Whiting, of the corps of engineers, previously in charge of the work—a young gentleman of a high order of talent, sound judgment, and discrimination—had frequently reported to his department, expressing “his want of faith in the plan adopted to make a communication between Albemarle Sound and the ocean,” and also his doubts as to its practicability at all, short of an enormous expenditure altogether disproportionate to the object. In his letter to General Totten, dated March 31, 1857, after referring to the fact of the excavation having filled, he remarks:

“By referring to my letter to you of September 3, 1856, you will see that the result was fully predicted and explained by me. Never having had any faith at all in the success of the plan, with the means at hand, these appearances decided me to stop the work until I should hear from you. Any further prosecution with a single dredge boat and the force available I cannot but consider an unwarrantable waste of public money.”

The products of eastern North Carolina mostly find a market through the Dismal Swamp Canal, which is too limited in its capacity; but the Albemarle and Chesapeake Canal are now engaged in excavating a canal of large dimensions, connecting Chesapeake bay and Currituck, Albemarle and Pamlico Sounds and their tributary streams, which they anticipate completing within next year, and when accomplished will obviate all necessity of a communication with the sea through Nag's Head.

#### IMPROVEMENT OF CAPE FEAR RIVER.

The works for the improvement were suggested and recommended by a commission, at the head of which was Professor Bache, of the coast survey. They first proposed the “protection of Bald Head from further abrasion by jettys like that at Fort Caswell.” The second is the “filling up of the two small openings near New Inlet, about 400 yards over and four feet deep in the middle at low water; the other, about 200 yards over and two feet deep at low water.” This portion of the work has been accomplished. It was commenced under the direction of Lieut. Woodbury, who used stone thrown loosely in in the construction of the dyke or dam across the inlet, with jettys of stone projecting into the sea at intervals, for the purpose of intercepting the travelling beach. This it has partially accomplished, but not so rapidly as was anticipated. In places the sea still washes through the stone, and but for a row of sheet piling inside would wash into the river; but I have no doubt the sand will eventually accumulate in front, particularly if the jettys are extended further into the sea. They are now too short.

The work was completed under the direction of Lieutenant Whiting, of the corps of engineers, who used sand bags for the purpose of closing the beach, which has proved much more effectual than the stone. In front of this work a beach of several yards in width has accumulated.

3d. A jetty from Zeke's island, to prevent New Inlet from making south.

4th. Closing up New Inlet.



The commission enter into an elaborating course of reasoning to show the effects to be produced by these works, and the great result to be anticipated from them, even to the restoration of the former regime of the river, with 20 feet of water on the western bar. Should these anticipations be realized, it would involve the necessity of deepening the river up to the city of Wilmington before that city could reap the benefits of the work, as but 12 feet draught, at high water, can be carried up to the city. In my opinion—and I have conversed with several intelligent gentlemen of the city who agree with me—that it would be far more beneficial to the commerce of Wilmington that New Inlet should be kept open; its bar is equally good as the western bar, and is far more accessible in certain winds than the western bar. Vessels bound to the north, and those coming from the north, which are by far the greater number which trade with this city, by entering and departing by the New Inlet save a great distance, and avoid the dangerous navigation of passing around the Frying-pan shoals. Again, the small coasters, which come to this port for a market with corn and naval stores from the eastern part of the State, if debarred an entrance by the New Inlet, and compelled to pass around the Frying-pan shoals, would, in all probability, run for Charleston.

In the event of New Inlet being preserved, it would be necessary to fortify it, which could be done at a far less expense than stopping it.

The estimate of the commission for closing New Inlet and the jetty at Zeke's island is \$399,000, which, considering the many vicissitudes to be encountered in a work exposed as it would be, I consider quite inadequate to the object.

The estimate of the commission for closing the two small inlets between Zeke's island and Smith's island with timber was \$8,400, and if stone was used, \$49,800. There has already been expended in closing these two small inlets \$134,000, and the work cannot be said to be thoroughly accomplished yet.

I respectfully recommend an appropriation of \$25,000 to maintain and extend the works between Zeke's and Smith's islands.

Respectfully submitted by your obedient servant,

W. TURNBULL,  
*Brevet Colonel.*

Colonel J. J. ABERT,  
*Chief Corps Top. Eng'rs, Washington, D. C.*

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## APPENDIX E.

OFFICE OF U. S. GOVERNMENT ROADS,  
*St. Paul, M. T., September 5, 1857.*

COLONEL: I have the honor to present the following report of the operations for the past year on the several roads under my superintendence; also of their present condition, and an estimate of the amounts required for their completion. Under the appropriations last made by

Congress the funds were not available for the construction of the roads until the 16th of July, which has necessarily delayed the operations to a late period of the season for this northern latitude. Much progress, however, can be made before its close.

The several works now under my charge are as follows, viz:

1. Road from Point Douglas to the mouth of St Louis river.
2. Road from Point Douglas to Fort Ripley.
3. Road from Mendota to Wabashaw.
4. Road from Mendota to the mouth of Big Sioux river.
5. Road from the Falls of St. Anthony to Fort Ridgely.
6. Road from Fort Ripley, *via* Crow Wing river, to intersect the main road leading to the Red River of the North.
7. Road from Swan river to Long Prairie.

The authorized surveys and location of the above roads not having been completed, I beg leave to respectfully refer you to the general map of the roads accompanying the annual report of my predecessor in 1855 as approximately indicating their locations. So soon as the surveys now in progress shall be completed, an accurate map will be made and submitted.

*1. Road from Point Douglas to the mouth of St. Louis river.*

This road extends from Point Douglas, at the confluence of the river St. Croix with the Mississippi river, to the mouth of St. Louis river, at Superior, Wisconsin, being a distance of about 181 miles.

At the date of my last annual report the appropriations previously made for this road were exhausted and arrearages incurred amounting to \$3,433 67. Under the appropriation of \$31,425 50, made since then, the arrearages have been paid and some portions of the road between the 163d mile station and Superior have been constructed, including a bridge of 56 feet span over Pokegoma river, (near 185th mile station,) besides several culverts, side ditches, and other work most required on that section of the road. An examination of the road from Superior to Snake river has been recently made by Mr. P. E. Bradshaw, the assistant engineer in charge of that division, who reports, under date of the 4th ultimo, that "the road from Superior to Pokegoma river (distance  $4\frac{1}{2}$  miles) is good, well graded, &c.; from Pokegoma river to Clear creek (distance about 12 miles) the road passes through an almost continuous tamarack swamp, between which points there are 6,100 feet of *corduroying* not covered with earth, and much of the swamp that is not even corduroyed or ditched. This part of the road (from Pokegoma river to Clear creek) is practically impassable, even at this the driest season of the year, excepting for foot or horseback passengers. A loaded wagon could not easily be drawn over the road. To render this part of the road passable, it should be ditched, corduroyed, and covered with earth nearly its entire length, (which has not been done, except in a very slight degree;) by these means a good road could be obtained. The tamarack swamps through the country vary in depth from one and a half to three feet, and have a good sand or clay bottom. On the distance above mentioned the timber is cut out full width and *partly* grubbed.

From Clear creek to Twin lakes (distance  $4\frac{1}{2}$  miles) the road passes over a higher land, with but little swamp. Not much grading has been done here. The bridges are all in, and the timber is cut out full width and grubbed. Three miles out from Superior a bridge 80 feet long, with bents twelve feet high, has been burnt. It will have to be reconstructed, in order to render the road passable for teams. From Twin lakes (169th mile station) to the 163d mile station the road has been cut out full width and partially grubbed."

The work required in the construction of the road from the 163d mile station to a point one mile south of Deer creek (distance about 46 miles) the assistant engineer reports to be as follows: A bridge of about 60 or 70 feet span over Black Hoof river, (near 163d mile station;) from 163d mile station to Portage river, about three miles of corduroying; also a bridge of 70 feet span over Portage river; between Portage and Willow rivers about three miles require to be corduroyed and ditched; between Willow and Kettle rivers about  $1\frac{1}{2}$  mile of the road requires to be corduroyed and ditched; the rest of this portion passes through high and dry pine barrens. The bridge over Kettle river (near 132d mile station) is defective in one of its lower chords, and needs repairs. Between Kettle river and Deer creek about one mile of the road requires to be corduroyed and ditched. Deer creek requires a bridge of 40 to 50 feet span. From Deer creek to Grindstone creek (distance four miles) the road has been cut out full width, with the exception of about  $\frac{3}{4}$  of a mile south of Deer creek; on this part of the road there is a little corduroying which requires covering with earth. Grindstone creek requires a bridge of 75 feet span, at least. From Grindstone creek to Snake river (distance 13 miles) the road has been cut out full width, grubbed, corduroyed, and ditched, so as to be in pretty good condition. The bridge over Snake river is broken into two parts, nearly at its middle; one part of it now rests one end on its abutment and the other end on the bottom of the river; the other part has floated about 30 rods down stream, and lodged on the head of an island. This bridge has a span of 174 feet in the clear, and was finished in January, 1856, under the superintendency of my predecessor.

From Snake river to Point Douglas (distance about 94 miles) the road has been constructed throughout, with the exception of that portion lying between Point Douglas and the 19th mile station, on which no work has yet been expended.

The authorized survey of this road is now being made, and its location has already been much improved between Deer creek and Kettle river bridge, and is likewise being improved between Kettle river bridge and the 163d mile station. No work whatever, except the bridge over Kettle river, has been expended on the road between Deer creek and mile station 163.

From mile station 103 to Superior the road is under contract for its construction with Mr. John D. Ludden, of Stillwater, from the 103d to the 144th mile station, and with Mr. Orrin W. Rice, of Superior, from the 144th mile station to Superior. The amount of the appropriation available for that portion of the road will be sufficient for and applied to cutting and grubbing it out to a width of 18 feet, and

to the construction of culverts, side ditches, corduroying, bridges, and other work most required between Deer creek and mile station 163.

Proposals are invited for constructing the section lying between Point Douglas and the 19th mile station, which, together with the repairs of the bridge over Kettle river, will also be done under the existing appropriation.

It is therefore hoped that the road will be opened throughout its whole extent, and made available for winter travel the coming season. It will, however, require much additional labor to render it practicable in all weather and in all seasons of the year.

The importance of this road to Minnesota and Wisconsin, in facilitating the development of their resources and in hastening the occupation of the valuable government lands in the northwest, cannot be too strongly represented, connecting, as it does, by the shortest route, the head of navigation of the Mississippi river with Lake Superior at its nearest practicable harbor.

I have therefore to recommend that an additional appropriation be made for its immediate completion, the amount required being exhibited in the following estimate :

1. *From Superior to "Twin Lakes," 21 miles.*

1. Bridges, five; total length, 140 feet, including the rebuilding of the burnt trestle bridge, 80 feet in length, (3 miles out from Superior,) at \$10 per lineal foot.....	\$1,400 00	
2. Corduroying 1,600 rods, at \$2 70 per rod.....	4,320 00	
3. Earthwork, (including side ditching, &c., &c.,) 25,560 cubic yards, at 26½ cents per yard.....	6,773 40	
Total.....		\$12,493 40

2. *From Twin Lakes to Grindstone creek, 54 miles.*

1. Bridges, five, (of spans from 55 to 75 feet;) total length, 325 feet, at \$15 per lineal foot.....	\$4,875 00	
2. Corduroying 1,000 rods, at \$2 70 per rod.....	2,700 00	
3. Earthwork, (including side ditching, &c., &c.,) 7,000 cubic yards, at 26½ cents per yard.....	1,855 00	
4. Cutting down trees 24 feet each side of centre strip so as to open the whole roadway to a width of 66 feet, being 270 acres, at \$40 per acre.....	10,800 00	
5. Rebuilding (on plan of Howe's patent truss) the bridge across Snake river, 186 feet long, at \$40 per lineal foot, being contractor's price for same).....	7,440 00	
Total.....		27,670 00
For engineering and office expenses and other contingencies, add 10 per cent. of the above.....		4,016 34
Total amount.....		44,179 74
Say.....		44,200 00

In my last annual report it was supposed that, from Superior out to Twin lakes, (a distance of 21 miles,) the road had been completed with the exception of a bridge required over Pokegoma river, as reported to me by my predecessor on turning over to me the charge of the work in June, 1856. The estimates therein submitted were moreover based on the maps, reports, and estimates then on file in this office, whereas the above estimates are based on more reliable surveys and

reports, since then made, combined with the reports and estimates of last year. The prices are the average of those paid under previous contracts for similar work on this road.

## 2. *Road from Point Douglas to Fort Ripley*

This road extends from Point Douglas up the valley of the Mississippi river, 144½ miles, to Fort Ripley.

At the date of my last annual report, the appropriations previously made for this road were exhausted.

A survey of the road has just been completed, from which it appears that a portion of it, in extent about 12 miles, between Point Douglas and St. Paul, is yet to be constructed; the bridge over Rum river, at Anoka, to be repaired; and the road in several places to be graded and constructed.

I have advertised for proposals for the construction of the unfinished portion of the road between Point Douglas and St. Paul, to be completed on or before the first of December next; the bridge at Anoka will be soon repaired; and the road in other places where required will be constructed as soon as practicable. The appropriation of \$4,695, made for this road by Congress at its last session, is sufficient for its completion.

## 3. *Road from Mendota to Wabashaw.*

This road extends from Mendota, (opposite Fort Snelling,) at the confluence of the Minnesota and Mississippi rivers, to Wabashaw, on the right bank of the Mississippi river 2½ miles below Lake Pepin, a distance of 76 miles.

In my last annual report this road was reported as finished, with the exception of the repairs of the bridge over Cannon river, (near Red Wing,) the cost of which I estimated at \$3,000. The appropriation made therefor was \$2,000.

After advertising for proposals for its repairs, the commissioners of Goodhue county, (the county in which it is located,) rather than lose the benefit of the appropriation, insufficient as it is for the purpose, contracted to complete the work on or before the 1st of November next.

## 4. *Road from Mendota to mouth of Big Sioux river.*

This road extends from Mendota, opposite Fort Snelling, southwardly through Minnesota and Iowa to the mouth of Big Sioux river, a distance of 279 miles, as originally located in 1853.

At the date of my last annual report this road was more or less constructed from Mendota to the 178th mile station, (measured from the mouth of Big Sioux river,) with the exception of the three "middle sections," so called, which extended from the 217th to the 235th mile station.

The appropriation had been nearly exhausted on the road between Mendota and the 178th mile station, except on the "middle sections,"

previous to my entering upon the duties of this station ; but in order to extend the benefits of the small available balance over as much of the road as practicable, as instructed, it was applied to the three sections named. I contracted with Mr. Thomas J. Frazier, of St. Paul, for the construction of the 1st and 2d "middle sections," which he completed on the 3d of November, 1856. Mr. Benjamin Parker, of St. Anthony, also completed his contract for the construction of the 3d "middle section" on the 7th of October, 1856. The amount thus expended however, was only sufficient to make that portion of the road barely practicable, by the construction of such bridges, culverts, corduroying, &c., as were most necessary. It is not, however, now recommended to expend any more labor upon the road between Mendota and the 178th mile station, with the exception of the completion of some corduroying near Mankato.

The road is now being surveyed to the extent that it has been constructed, on the completion of which the small balance of the appropriation now on hand will be exhausted. An additional appropriation will therefore be required for the construction and completion of the road from 178th mile station to the mouth of Big Sioux river, being a distance of 178 miles, for which I submit the following estimates, based on Captain Reno's survey and estimates made in 1853. Experience on this and other roads in this Territory having conclusively proved that his estimates for earth work and bridges are much below contract prices, I have so modified his estimates as to make them correspond with the rates heretofore paid, taking into consideration at the same time, the greater inaccessibleness of the country and the great scarcity of timber.

His estimates for grubbing, clearing, and smoothing off road bed, corduroying and culverts, are adopted, being	\$1,286 00
For 55,000 cubic yards of earth work, (including ditching, excavation, and embankment, and the necessary amount of haul,) at a probable cost of 25 cents per cubic yard...	13,750 00
For 59 bridges, having spans from 12 feet to 134 feet in length.....	17,505 00
Add ten per cent. for contingencies, including engineering and office expenses, &c., &c., &c.....	3,254 00
Total amount required for completing the road.....	35,795 00
Say.....	36,000 00

##### 5. Road from the Falls of St. Anthony to Fort Ridgely.

This road extends from Minneapolis, at the Falls of St. Anthony, via Carver and Henderson, to Fort Ridgely, a distance of 95 miles.

It having been determined by the department, as by instructions received on the 14th of July, to apply the appropriation to this territorial road via Henderson, in preference to the other proposed routes, contracts were at once made for cutting out the timber on this road with Mr. A. C. Smith, of Minneapolis, for the "St. Anthony section," extending from Minneapolis to the eastern boundary of Sibley county,



and with Mr. J. W. McComb, of St. Paul, for the "Fort Ridgely section," which extends from the eastern boundary of Sibley county to Fort Ridgely—they having been the lowest bidders for the same. The work is to be completed on or before the 30th of November next. No further appropriation will be required to effect the object indicated in the law making the appropriation.

6. *Road from Fort Ripley, via Crow Wing river, to the main road leading to the Red River of the North.*

This road is to extend from Fort Ripley, via Crow Wing river, in a northwestern direction so as to intersect the main road leading from Sauk rapids to the Red River of the North, near Wild Rice river east, the distance being probably about one hundred and sixty miles.

This road is now being surveyed and located by Mr. George H. Belden, assistant surveyor and engineer, as expeditiously as the difficulties attending it will allow. When last heard from he had reached the last crossing of Crow Wing river, distant about forty miles from Fort Ripley.

This road is one of the most important to be made in Minnesota Territory, connecting, as it will, the Upper Mississippi with the navigable waters of the Red River of the North. It will be indispensably necessary for the transportation of troops and supplies to the new military post to be established on that river under the appropriation made by Congress at its last session, and of the highest importance to the large and increasing trade with Pembina and the Selkirk settlement, as well as with numerous other settlements now being established in the valley of that extensive and navigable river.

The survey and location of the road being still unfinished, an accurate estimate cannot now be made of the amount which, in addition to the \$10,000 heretofore appropriated, will be necessary to complete it. The amount of \$25,000 can be expended to great advantage in its partial, if not its entire, construction. It is therefore to be hoped that Congress will bestow upon it the attention to which its importance entitles it, and appropriate at an early day the amount necessary for its completion.

7. *Road from Swan river to Long Prairie.*

This road extends from the Mississippi river, near the mouth of Swan river, to the old Winnebago agency, at Long Prairie, a distance of twenty-eight miles. It is entirely completed.

I have also to report that there exist no arrearages on any of the works under my charge. Their monetary condition is exhibited in the following tabular statement, showing the amounts which have been appropriated since their commencement, and their available resources on the 1st of September, 1857, together with the additional amount required for their completion.



Designation of road.	Amounts appropriated—			Unexpended balance of appropriation, September 1, 1857.			Amount estimated to complete the roads.
	Previous to 1857.	In 1857.	Total.	In U. States treasury.	In hands of superintendent.	Total.	
From Port Douglas to mouth of St. Louis river----	\$89,213 50	\$31,425 50	\$120,639 00	\$21,425 50	\$3,482 26	\$24,907 76	\$44,200 00
From Port Douglas to Fort Ripley-----	43,494 09	4,695 01	48,189 10	2,945 01	1,198 94	4,143 95	-----
From Wabashaw to Mendota-----	38,871 76	*2,000 00	40,871 76	2,000 00	-----	2,000 00	-----
From Mendota to mouth of Big Sioux river-----	62,475 68	-----	62,475 68	-----	408 22	408 22	36,000 00
From Fort Ripley, via Crow Wing river, to the main road leading to the Red River of the North.	10,000 00	-----	10,000 00	8,403 75	116 11	8,519 86	25,000 00
From the Falls of St. Anthony to Fort Ridgely----	5,000 00	-----	5,000 00	4,050 00	478 69	4,528 69	-----
Total-----	-----	-----	-----	-----	-----	44,508 48	-----

\* For repairing Cannon river bridge.

GEO. THOM,  
Captain Topographical Engineers.

## APPENDIX F.

*Annual report to Bureau of Topographical Engineers ; 1st and 2d, St. Clair flats ; 3d, St. Mary's river ; with an epitome : By A. W. Whipple, Captain of Topographical Engineers ; September, 1857.*

OFFICE OF ST. CLAIR FLATS AND ST. MARY'S RIVER IMPROVEMENTS,  
*Detroit, Michigan, September 1, 1857.*

SIR: I have the honor to submit the following annual report of operations upon works with which I am charged :

1. *Deepening the channel over the St. Clair flats.*

The sum of forty-five thousand dollars was appropriated for this improvement July 8, 1856. I was assigned to the duty October 8, 1856, but detained in Washington for the completion of other operations until the 1st of November following. The extracts here given from the correspondence relating to this subject will serve to explain the causes of delay in the commencement of the dredging operations.

*DETROIT, January 8, 1857.*

SIR: In compliance with your directions of 30th ultimo, I have examined the charts of the St. Clair flats, just completed in the office of the lake survey, and hasten to communicate my views with reference to the most available channel for improvement, with an estimate of the probable cost, and present a plan of operations for the expenditure of the appropriation at present available. There is less time for the consideration of these subjects than I would desire, but the period when active operations upon the flats should commence is rapidly approaching, and the outfit machinery for the work should be collected without delay ; hence the system to be adopted which is the basis upon which the preparations depend, ought to be distinctly marked out and clearly understood at the earliest period practicable.

I shall therefore refer very briefly to the points above mentioned.

1. With regard to the best channel for improvement. It is well known that the North Pass is at present generally used by vessels navigating the lakes, on account of its superiority in depth of water upon the bar. Its course, however, is very circuitous, and the distance great where dredging would be necessary for its improvement. Less expense would be required in deepening the channel which leads to the South Pass ; and, as the distance is shorter by that route, all the navigators and others with whom I have conversed upon the subject prefer to have it improved. Besides, the report of the board of engineers to the chief topographical engineer in 1854, recommending the improvement of the middle channel of the South Pass, was approved by the Secretary of War ; and I see no new facts elicited by the examination of the recent lake survey charts to render it desirable to reconsider the question.

2. With reference to its probable cost. For the consideration of this subject I shall again adopt the views of the board of engineers,

as reported to the chief of topographical engineers, and approved by the Secretary of War in 1854, viz: to dredge so as to give a channel 300 feet wide at bottom and 12 feet deep, the sides having an equal slope to those of the natural channel.

For making this estimate, the officer commanding the lake survey has, according to your directions, afforded great facilities, and, at my request, a chart of the debouchure of the St. Clair river, by the South Pass, has been made upon an enlarged scale, from which profiles across the flats have been constructed with considerable accuracy. These profiles have enabled the assistant upon the survey to compute with much precision the actual quantity of excavation necessary to obtain a channel of the required dimensions, viz: 300 feet wide and 12 feet deep. The amount obtained from this computation is 144,250 cubic yards. This is exclusive of the side slopes. By the slopes of the natural channel, I understand the board to mean that inclination which the sides of the excavated channel would naturally assume when exposed to the action of the current and waves. It cannot be accurately determined without further examinations of the material of which the flat is composed, but it will not probably exceed an inclination of 1 in 20. Upon this hypothesis I have taken the elements from the lake survey chart and computed the side cutting required, which amounts to 49,713 cubic yards. To obtain such a slope it would be necessary to dredge from each side of the proposed channel over a space of variable width, the maximum being 120 feet. By this excavation about 60 feet would be added to the width of the channel way, giving a depth of water exceeding  $10\frac{1}{2}$  feet, thus increasing the facilities for navigation by allowing vessels to pass each other without risk of collision.

The length of channel to be dredged, according to the results of the lake survey, is 4,175 feet. The width of channel required is 300 feet, the depth 12 feet. The amount of excavation necessary to be provided for, as stated above, is—

For channel.....	144,250
For side slopes (nearly).....	49,750
Total.....	<u>194,000 cubic yards.</u>

It will be perceived that the amount of material to be removed, as determined by the survey of 1856, greatly exceeds any previous estimate. Hence the expense of the operation will necessarily prove greater than has been anticipated.

*Estimated cost of excavation.*

For two additional dredging machines, at \$12,000 each.....	\$24,000
For nine scows (three to each dredge,) at \$700 each.....	6,300
For one steam-tug.....	17,000
For repairing old dredging machine and equipping.....	2,000

For excavating 194,000 cubic yards of earth, at 18 cents per yard.....	34,920
For office rent, stationery, &c., &c.....	2,180
For contingencies, repairing machinery, &c., at 10 per cent.	8,600
	<hr/>
	95,000
	<hr/>

In the above statement I have provided for a larger outfit of machinery than others have given in their estimates, in order to hasten the work to a rapid conclusion.

It is my opinion that, if the work is to be done, it should be executed quickly, and thus remove, as soon as possible, this great obstruction to the commerce of the lakes. The boats and machinery, when needed no longer for this work, may be transferred to another, or sold, and the proceeds restored to the treasury.

With the outfit proposed, the channel way, with its side slopes, may be completed, in accordance with the estimates, in two working seasons. When opened, the current through it would necessarily have an increased velocity, and tend towards preventing the deposition of sediment within it. The small quantity that might settle there would probably be agitated and scattered by the numerous lake steamers in their passage.

All accounts agree that, since the first settlement of this region and the navigation of the lakes, no apparent change has taken place in these flats, except where the vessels pass through. There the depth of water appears to have slightly increased. Hence there seems every reason to believe that the channel, when excavated, will prove substantially permanent.

As the present appropriation for deepening the channel over the St. Clair flats amounts to only \$45,000, it is evident, from the foregoing, that the original intentions of the department cannot be fully carried into effect, and it becomes necessary to adopt a plan of operations upon a diminished scale. I consider it of great importance that, during the first season of operations, a navigable channel should be opened from the deep water of the river to the deep water of the lake, so as to carry the current of the stream and its sedimentary matter entirely through, and afford an improvement which will be of decided advantage to the commerce of the lakes. I would, therefore, propose to adopt a narrower width for the channel and side slopes, in order to give completeness to the work, upon such a scale as the appropriation will allow.

I will now present some of the data upon which the above proposition is founded.

Mr. Williams, who had charge, under the Buffalo Board of Trade, of the dredging on the St. Clair flats in the summer of 1855, with the government dredging machine, and another of smaller dimensions, reports an excavation from August 1 to October 24 of 18,453 cubic yards, giving an average of less than 220 cubic yards per day. It is hoped that, by judicious management the coming season, an average of at least 250 cubic yards per day may be excavated by each dredging

machine; this would give with a single dredge 37,500 cubic yards of excavation in one working season of 150 days, or 75,000 cubic yards with two dredging machines.

To obtain a channel of 105 feet wide, 12 feet deep, and 4,175 feet in length, it would be necessary to excavate about 50,500 cubic yards. Deducting this amount from 75,000 cubic yards, the quantity estimated to be performed by two dredging machines, and the remainder, 24,500 cubic yards, would be applicable to the sides of the channel, and give slopes of about 1 upon 20, which is supposed necessary to prevent them from sliding into the excavated space.

Having stated the amount of work which may reasonably be expected to be performed with the present appropriation, I will now give my views of the manner in which the money should be applied.

In the first place, a suitable outfit of boats and machinery is absolutely necessary. It has already been shown that one dredging machine is entirely inadequate to the performance of sufficient excavation to produce an available channel during the first season; hence I would recommend the purchase of a dredge in addition to that on hand. The remainder of the equipment has already been authorized by the War Department.

*Estimated cost of equipment.*

For one small steam-tug.....	\$14,000
For one new steam dredging machine.....	12,000
For four dumping mud scows.....	2,800
For repairing old dredging machine.....	1,100
For chains, anchors, and other furniture.....	900
For one surveying boat.....	200
<b>Total for equipment.....</b>	<b>31,000</b>

*Statement for estimated cost for labor and subsistence of men and fuel in working the above machinery for one season.*

FOR STEAM-TUG.

One owner, for five months, at \$150.....	\$750
One captain of tug, for five months, at \$75.....	375
One engineer, " " " at \$75.....	375
One deck hand, " " " at \$30.....	150
One tinman, " " " at \$30.....	150
One cook, " " " at \$30.....	150
Four boatmen, " " " at \$20.....	400
<b>Amount for wages.....</b>	<b>\$2,350</b>
Subsistence for ten men, 150 days, at 50 cts. per day each	\$750
Fuel for steamer, " " 2 cords per day, at \$3	900
<b>Total expense of steamer.....</b>	<b>1,650</b>
	<b>\$4,000</b>

## FOR TWO DREDGING MACHINES.

Two captains, for five months, at \$75 per month each...	\$750
Two engineers, " " at \$75 " " " ...	750
Two brakemen, " " at \$75 " " " ...	750
Two tinmen, " " at \$30 " " " ...	300
Two men for tripping lines, for five months, at \$30 each	300
Two boys, as attendants, " " " at \$15 each	150
One blacksmith, " " " at \$60.....	300
One carpenter, " " " at \$60.....	300
Six men, to attend scows, " " " at \$25 each	750

Amount for wages.....	\$4,350
Subsistence for twenty men, for 150 days, at 50 cents per day each.....	\$1,500
Fuel for two dredges, for same period, six cords per day,	2,700
	<hr/> 4,200

Total expenses of two dredging machines.....	<hr/> 8,550 <hr/>
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## RECAPITULATION.

For equipment in boats, machinery, &c.....	31,000
For expenses in operating with steamer.....	4,000
For expenses in working two dredging machines.....	8,550
For contingencies.....	1,450
	<hr/> 45,000 <hr/>

The above estimated cost of equipment is about double that of the current expenses for the season. But I see no means of reducing the estimates except by suggesting the charter of a steam-tug, which may be effected for about \$4,500 for the season, instead of purchasing for \$14,000. Such a modification of the plan would leave a balance of about \$9,500 available for carrying on the work during a portion of a second season.

Very respectfully, your obedient servant,

A. W. WHIPPLE,

*Captain Topographical Engineers.*

Colonel J. J. ABERT, *Chief Top. Eng's,*

*Bureau Top. Eng., Washington, D. C.*

IN THE SENATE OF THE UNITED STATES,  
January 5, 1857.

*Resolved,* That the Secretary of War lay before the Senate any additional information that has been received about the St. Clair flats, and a copy of the chart of said flats, and to state the amount of any additional appropriation, if any, that may be required for said work.

Attest:

ASBURY DICKINS,  
*Secretary.*

OFFICE OF ST. CLAIR FLATS IMPROVEMENT,  
*Detroit, Michigan, Jan. 12, 1857.*

SIR: I have the honor to acknowledge the receipt of your communication of the 7th instant, enclosing a copy of the resolution of the United States Senate calling upon the Secretary of War for additional information about the St. Clair flats, and a statement of "the amount of any additional appropriation, if any, that may be required for said work."

In my letter of the 8th instant there is presented the computed amount of excavation required, according to the results of the survey of 1856 to obtain a channel 300 feet wide, 12 feet deep, and 4,175 feet long, with side slopes of 20 feet base to 1 foot perpendicular.

The computation gives 194,000 cubic yards of material to be removed. This quantity is considerably greater than that deduced from previous surveys when the height of water upon the bar was probably at its maximum, and consequently the estimates heretofore made, being based upon that data, are not sufficient for the accomplishment of the work.

The cost of the excavation per cubic yard, and the time necessary for the operation, will depend upon the completeness of the equipment in boats, machinery, &c., used.

The statement already referred to is based upon the idea of completing the operation in two working seasons, and the estimated cost is as follows, viz:

For two additional dredging machines, at \$12,000 each.....	\$24,000
For one steam-tug.....	17,000
For nine scows (three to each dredge).....	6,300
For repairing of old dredging machine, and for its equipment of chains, anchors, &c.....	2,000
For excavating 194,000 cubic yards of earth, at 18 cents per cubic yard.....	34,920
For office rent, stationary, &c.....	2,180
For contingencies, repairs of machinery, &c., at 10 per cent.	8,600
	<hr/>
	95,000
Appropriation on hand to be deducted.....	45,000
	<hr/>
Amount required to complete the work.....	50,000
	<hr/>

As a large portion of the above mentioned machinery could, at the end of this operation, be available for other government work, I would suggest the propriety of carrying on the improvements in the St. Mary's river upon a correspondingly diminished scale for two seasons, and then transfer the St. Clair equipment to that place. Otherwise, it could be sold and the proceeds returned to the treasury.

Very respectfully, your obedient servant,

A. W. WHIPPLE,  
*Captain Topographical Engineers.*

Colonel J. J. ABERT,  
*Chief of Top. Eng., Bureau Topographical Engineers.*



WASHINGTON, *February* 9, 1857.

SIR: The undersigned, senators and representatives in Congress from portions of the country more or less interested in the commerce and navigation of the upper lakes, beg leave to submit that they understand that a proposition has been laid before the War Department by which a channel 250 feet broad and thirteen feet deep may be excavated over the St. Clair flats for the amount (\$45,000) appropriated by Congress for that purpose.

We consider the object very important to the lake regions, and earnestly recommend that a contract may be entered into for its accomplishment, with such guaranties and securities as may seem proper to you.

We learn that the cost of excavation will not exceed thirty cents per yard; and if the quantity excavated should not reach the amount of the appropriation, the balance would remain in the treasury. Should it exceed it, the excess would have to be supplied by the contractor.

We are, sir, respectfully, your obedient servants,

Lewis Cass  
Charles E. Stuart  
J. D. Bright  
S. A. Douglas  
Wm. Bigler  
A. Hall  
V. B. Horton  
L. D. Campbell  
J. H. Nichols  
Jno. Williams  
Smith Miller  
O. F. Moore  
R. N. Broadhead  
L. Trumbull  
Henry Dodge  
T. E. Pugh  
S. S. Marshall  
Samuel Galloway  
W. R. Sapp  
D. P. Halloway  
Jno. A. Bingham  
E. Wade  
D. Wells, jr.  
J. W. Pettit  
J S. Harrison

J. Thorington  
Samuel C. Bradshaw  
B. Stanton  
James Knox  
H. D. Scott  
J. H. Woodworth  
B. F. Wade  
S. G. Haven  
D. S. Walbridge  
Wm. A. Howard  
Charles Durkee  
Wm. H. Seward  
Hamilton Fish  
P. Bliss  
W. H. English  
G. W. Peck  
E. B. Washburne  
G. R. Dunn  
B. F. Leiter  
C. K. Watson  
Edward Ball  
W. Cumback  
J. C. Davis  
John Dick.

Hon. JEFFERSON DAVIS,  
*Secretary of War.*

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WAR DEPARTMENT, *February* 12, 1857.

Colonel Abert will direct Captain Whipple to contract (after due notice) with responsible parties to excavate a channel through the St.

Clair flats two hundred and fifty feet wide, with a depth throughout that width of thirteen feet, with side slopes of twenty horizontal to one vertical, for a sum not to exceed \$40,000, to be paid when the work is completed. Security will be taken to insure the thorough and prompt execution of the work, and to prevent its abandonment, under any circumstances, before completion.

The United States dredge boat belonging to that work will be loaned to the contractors upon their agreement to return it in as good order as when received by them.

JEFF'N DAVIS,  
*Secretary of War.*

OFFICE OF ST. CLAIR IMPROVEMENT,  
*Detroit, February 18, 1857.*

Proposals will be received at this office until the 10th day of March next for excavating a channel through the St. Clair flats two hundred and fifty feet wide, with a depth throughout that width of thirteen feet, with side slopes of twenty horizontal to one vertical. Should a contract be made and approved by the War Department, the sum agreed upon will be paid when the work is completed. Security will be required to insure thorough and prompt execution of the work, and to prevent its abandonment, under any circumstances, before completion.

The United States dredge boat belonging to that work will be loaned to the contractors upon their agreement to return it in as good order as when received by them.

A. W. WHIPPLE,  
*Captain Topographical Engineers.*

BUFFALO, *February 24, 1857.*

DEAR SIR: On my return home on Sunday last, Captain Dorr handed me a copy of your advertisement inviting proposals for the dredging of the St. Clair flats, which was the first I had seen of it.

The manner proposed of doing the work does not appear to be the same as I understood you to say you would recommend, and I fear that, unless amended, parties likely to propose for doing the work will be deterred from doing so from the want of a correct explanation of the width and length of the channel proposed to be dredged, and an estimate of the number of yards to be excavated. The advertisement says that the channel shall be two hundred and fifty feet wide. The channel banks to be one foot vertical to twenty horizontal.

I think you suggested to me that the proper way would be to advertise for proposals to dredge a channel the length necessary, as wide as the \$45,000 would pay for, at thirty cents per cubic yard, (after ascertaining what that width would be from Captain Mead's survey;) and after that channel was completed by the contractors, then the government should pay the amount appropriated; that whatever amount of

private subscription and other appropriations could be obtained should be expended in widening that channel.

Such conditions would not be so stringent as to prevent parties proposing for the works. I hardly think that you could have drawn up that proposal as published, or it would have been more definite, and I fear that it may have originated from some efforts on my part. The last time I saw you I told you what steps I had taken, after sending you the proposal of Mr. Sims, which you wrote me you had forwarded to Washington.

On the receipt of your letter, saying you had forwarded Sims' proposal to the department at Washington, I immediately wrote to parties in Chicago requesting them to write to members of the Senate, at Washington, and had letters written in this city to General Cass and Mr. Haven, our representative, requesting the several members to use their influence with the department to have the work of dredging the St. Clair flats let by contract to the lowest bidder, and not have three-quarters of the appropriation invested in dredge boat, steamer, and mud scows. One of these letters stated that if this \$45,000 could be all expended in dredging, that, together with what could be otherwise obtained, would dredge a channel the entire length of the flats 250 feet wide and 13 feet deep.

We were advised that General Cass and the other members written to did use their influence with the Secretary of War, who consented to the proposition. That is all I have done in the matter, and all I know about it. I supposed, of course, that the subject would be submitted to you and your plan adopted. We have never submitted any plan for dredging the flats, except that of a request that it should be done by contract.

I think the proposal should be amended so as to offer some inducement for parties to propose for the work; and I should feel myself under renewed obligations to you if you will give me your opinion and advice in the matter as to how they should be amended, and whether we had not better apply to the same parties for the necessary correction.

No person would propose to excavate a channel 250 feet wide, without knowing the length of the channel, the number of yards to be excavated, and the distance to which the earth should be removed. Please give me these particulars from Captain Mead's notes of the survey and estimates.

When will you probably be in Buffalo? Please let me hear from you at the earliest possible moment. If anything more is done in Washington, it will have to be done before the 4th of March.

I remain, dear sir, your obedient servant,

WATSON A. FOX.

Captain A. W. WHIPPLE,

*Topographical Engineers, Detroit, Michigan.*

## OFFICE OF ST. CLAIR FLATS IMPROVEMENT.

SIR : In compliance with your instructions of the 12th ultimo, the advertisement which is appended was published in Detroit and Buffalo subsequently to the date of it ; one bid only has been received, a copy of which I have the honor to transmit herewith to the bureau.

As it does not conform to all of the required conditions, I would respectfully request instructions from the department with regard to its acceptance.

Very respectfully, your obedient servant,

A. W. WHIPPLE,  
*Captain Topographical Engineers.*

Col. J. J. ABERT,  
*Chief Topographical Engineers, Washington, D. C.*

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BUREAU OF TOPOGRAPHICAL ENGINEERS,  
*Washington, May 23, 1857.*

SIR : Your letter of the 20th of April was duly submitted to the War Department, with the following endorsement :

“ Respectfully suggested that Captain Whipple be authorized to make a contract upon the best terms he can ; but not to be effective, unless approved by the War Department. No stipulation in said contract about the appropriation by Canada. The season for work on the St. Clair flats is rapidly approaching.”

J. J. ABERT,  
*Colonel Corps Topographical Engineers.*

Upon which the endorsement of the honorable Secretary of War is as follows :

“ The recommendation of the chief topographical engineer is approved.

“ J. B. FLOYD,  
*Secretary of War.*

“ WAR DEPARTMENT, *May 22, 1857.*”

You will therefore proceed, without delay, to act in accordance thereto.

Respectfully, your obedient servant,

J. J. ABERT,  
*Colonel Corps Topographical Engineers.*

Captain A. W. WHIPPLE.

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NOTICE TO CONTRACTORS.

Proposals will be received at this office until 5th June next for excavating by the cubic yard at the St. Clair flats. Contractors will be required to give bonds to put in operation, on or before the 5th July

next, machinery sufficient to excavate and remove to a distance of five hundred yards from the channel at least one thousand cubic yards of material per day; and to prosecute the work to the satisfaction of the agent of the United States during the present working season.

The undersigned reserves the right to accept or reject any one of the bids received.

A. W. WHIPPLE,

*Captain Topographical Engineers.*

OFFICE ST. CLAIR FLATS IMPROVEMENT,

*Detroit, Michigan, May 25, 1857.*

BUFFALO, NEW YORK, *June 19, 1857.*

SIR: I have the honor to submit for approval the enclosed contract made with T. D. Barton, esq., for dredging the St. Clair flats.

I would respectfully request that, if approved before the 25th instant, information of it may be sent to Mr. Barton at this place, and to myself at Detroit, by telegraph.

Very respectfully, your obedient servant,

A. W. WHIPPLE,

*Captain Topographical Engineers.*

Colonel J. J. ABERT,

*Chief Corps Topographical Engineers, Washington, D. C.*

#### CONTRACT.

These articles of agreement, made this nineteenth day of June, A. D. one thousand eight hundred and fifty-seven, by and between Theodore D. Barton, of the city of Buffalo, and State of New York, of the first part, and Captain A. W. Whipple, of the United States corps of topographical engineers, on behalf of the government of the United States, of the second part, *witnesseth:*

That the party of the first part, for and in consideration of the condition hereinafter mentioned, hereby covenants and agrees with the party of the second part to perform such dredging as may be required for the construction of a channel through the St. Clair flats, and to deposit the material removed at such points as the agent of the United States may direct.

It is further understood and agreed by the parties to this contract, that the party of the first part will put in operation upon the work, as early as practicable after the approval of this contract, two steam dredging machines of sufficient capacity to excavate one thousand cubic yards per day, with a good steam-tug and dumping boats sufficient to dispose of the material, and will vigorously prosecute the work as long as required by the government of the United States.

Moreover, the party of the first part agrees, in case he shall be advised of the approval of this contract as early as the 25th of this

month, to commence the operations as above specified, with full equipments of men and machinery, on or before the 1st day of July next, and from that period to remove upon an average not less than 1,000 cubic yards of material per day during the present working season.

In consideration whereof, the party of the second part, for and in behalf of the United States in the matter aforesaid, hereby agrees, in case the work above mentioned shall be executed in conformity to the conditions of this contract, and be accepted by the authorized agent of the United States, to make monthly payments to the party of the first part of ninety per cent. upon the amount of work accomplished, at the following prices, viz :

1. For common excavation, such as sand, gravel, stone, or clay not cemented, the sum of 30 cents per cubic yard. The material to be measured on the scows at or near the place of deposit.

2. For hard pan, or cemented sand and clay, one dollar and fifty cents per cubic yard.

3. For rock, whether boulder or in place, measuring above one-half cubic yard, at the rate of \$10 per cubic yard ; the party of the second part, or other authorized agent of the United States, being the judge as to the classification of the different materials above mentioned.

The reserved 10 per cent. will be paid to the party of the first part when the required operation has been completed to the perfect satisfaction of the United States, or its authorized agent. During the operations an agent of the United States, or a sub-agent under the orders and control of the officer in charge, will be present to direct where the work shall be performed ; to determine the slopes required for the formation of the sides of the channel ; designate the points where the material shall be deposited, and measure and keep an account of the amount excavated.

In case it shall be deemed necessary to cause the material excavated to be removed more than 500 yards from the place of dredging, the officer in charge shall estimate the reasonable cost of such extra removal, and add it to the sum already agreed upon to be paid ; and should any differences of opinion arise between the party of the first part and the sub-agent of United States with regard to this agreement, they shall be referred to the officer in charge, whose decision shall be final.

It is moreover understood and declared by the parties to this contract, that no member of Congress, or officer of the army or navy of the United States, has any interest or concern directly or indirectly in said agreement. That said agreement, or any part of it, or any act growing out of it, cannot be transferred, but shall be executed by the party of the first part or some person answerable to such party, who is alone responsible for its fulfilment.

It is also understood and agreed by the parties to this contract, that it is not binding to the United States, or will not go into operation until it has been sanctioned by the Secretary of War, or the chief of the topographical engineers at Washington.

In witness whereof, the parties to this agreement hereunto set their

hands and seals, in presence of the subscribing witnesses, on the day and year before mentioned.

Done in quadruplicate.

THEODORE D. BARTON,  
By WM. R. STRONG, *Attorney*.  
A. W. WHIPPLE,  
*Captain Topographical Engineers.*

#### *Endorsements.*

"Examined and recommended to be approved,

"J. J. ABERT,

"Colonel Topographical Engineers.

"JUNE 22, 1857."

"WAR DEPARTMENT,

"June 22, 1857.

"Approved.

"J. B. FLOYD,

"Secretary of War."

#### JOURNAL.

##### ST. CLAIR FALLS, MICHIGAN.

*Monday, June 29, 1857.*—Captain A. W. Whipple and party left Detroit at about midnight for St. Clair flats, Michigan, on the steam-tug "United," chartered for the purpose; had on board posts and sinkers for staking out the channel to be dredged.

*Tuesday, June 30.*—Anchored at 6 a. m. near south channel. After breakfast, took the yawl and sounded channel from red buoy No. 4 to the lake; returned to steamboat, hove up anchor, and took a berth to the westward, near buoy; again took yawl and staked out the channel to be dredged. Water rough, consequently soundings only approximated. The water on the flats about one foot higher than usual at this season. Returned to steamer. Towards sundown, breeze freshened from the northwest; weighed anchor and steamed for river; run aground at bend outside of South Pass; got off in about an hour; dropped anchor in the river, opposite Macomb's triangulation station.

*Wednesday, July 1.*—Sunrise, morning cold; wind fresh from N.W. Mr. J. D. Barton, the contractor for the dredging, came aboard for instructions where to place dredges, &c. He had the machines towed up yesterday, but having little knowledge of the locality, they were anchored in or near the north channel.

About 7 a. m. the wind fell; water smooth; weighed anchor and took up old berth near No. 4 buoy. We found there two steam dredges, one steam-tug, and four dumping scows, with force of men ready to commence operations. A canal boat was stationed for workmen's quarters.

At noon I received orders from Captain Whipple to superintend the dredging; bundled up kit and transferred it to canal boat, and self to



dumping scows to measure material excavated. Captain Whipple proceeded to place more channel marks.

Dredges commenced excavating in 13 feet water—bottom coarse sand—the dredges apparently in good working order; not so the dumpers; the doors don't fit close enough, and the sand works out between them. The place of deposit for the material excavated is four hundred and fifty yards from the centre of the channel to be dredged. Five hundred yards being the maximum distance stipulated in the contract, fifty yards are allowed to deposit in. The place where the deposits are made is a "blind channel" running parallel to, and at the above mentioned distance from, the line of excavation. It contains about twelve feet of water. A ledge or bank lying between it and the dredging ground, with not more than nine feet above, it is very improbable that the deposits will be carried back again to the channel.

The dredges operated until sundown.

Number of dumps this day, 7.

Number of cubic yards of material excavated, 249.

*Thursday, July 2.*—Morning cold; wind from northeast, blowing fresh. Commenced dredging before sunrise; machines work well; scows not fit for use until repaired so as to remedy leakage; they contain a fraction under forty-four cubic yards each, yet the dredges excavate from sixty to eighty yards of material to fill one scow. The sand runs through the doors with the current nearly half as fast as it is put into the scow; consequently the material excavated by the hindmost dredge fills up the channel formed by the foremost. Scows lose a large quantity between dredges and place of deposit; all measurement made at the latter place. I had a short staff graduated to-day into feet and inches, and attached to it a slipper of about four inches square to prevent it from sinking in the sand or mud. This I find very convenient for estimating the surplus or deficiency of material in the scows.

At my request the foreman went to Detroit to-day to procure canvas for the dumpers, to prevent leakage. Blew hard off the land from northeast to-day, with heavy rain at intervals; did not prevent work, however. Mr. Allen arrived here to-day in steamer "Forester" to assist me. Captain Whipple returned to Detroit in the afternoon in the tug "United."

Number of dumps this day, 10; number of cubic yards excavated, 379.

*Friday, July 3.*—Wind during forenoon; light from northwest; weather pleasant; afternoon, wind variable with showers. Dredged before breakfast; did no good; half of material leaked out before return from breakfast. Eight o'clock a. m. ran out of wood. Tug went to Algonac to procure some. Dredges idle until 2 p. m., the time of return of tug. Foreman returned from Detroit at 11 a. m.; brought canvas for scows; carpenters set immediately to work repairing them; finished one in a short time; holds the sand well; dredged until dark; at this time three scows were canvassed at bottom and one hopper of the fourth; not canvas enough for the second hopper.

Number of dumps, 9; number of cubic yards excavated, 357.

*Saturday, July 4.*—Morning hazy; wind light, from northeast; commenced work at daylight; dredges worked well till noon; tug went to Algonac for wood about 10 a. m.—returned about 3 p. m.; dredge No. 1 (leading) broke pinion wheel at noon—idle rest of day; worked with dredge No. 2 until 7 p. m. As the machines would not be worked until Monday, I concluded to go to Detroit in tug. A new pinion wheel was to be procured, and a scow (to hold wood) to be towed up. Mr. Allen accompanied me. He was ordered to go to St. Mary's river. Arrived in Detroit at 10 p. m.

Number of dumps this day, 12; number of cubic yards excavated, 524.

*Sunday, July 5.*—At about 5 a. m. on this morning the tug caught fire under the boiler while lying near the government dredge at Detroit; cut a hole in her with an axe, and sunk her; employed a fire company to pump her out with their engine; foreman then hired steam tug "United" for operations on the flats; left Detroit on board "United" at 3 p. m.—arrived at flats at 7 p. m.; foreman could not succeed in procuring at Detroit either wood scow or wheel. We towed up a skiff for government service.

*Monday, July 6.*—Commenced dredging at daylight; dredge No. 1 in tolerable working order again. The blacksmith was set to work during the night to make enough iron coggs for the pinion wheel. *Eleven a. m.*—Steamer "Dart" towed up a *dipper handle* for No. 2—the old one was cracked. Mr. Pexton sent up here by Captain Whipple in the stead of Mr. Allen; more material got out this forenoon than on any preceding one; dumped ten scows. *Two p. m.*—Pinion wheel again broken—this time in two parts; dredge cannot work. A vessel with wood arrived from Algonac—wood for dredges; begins to look more like work, but still there is a great deal more to be done to carry out the spirit of the contract. Everything seems to have been got up in too great a hurry, neither dredges nor scows in proper condition on being placed on the work, and no plan adopted for procuring wood. When the dredges *could* work they were unable to do so through want of fuel. *Three p. m.*—Foreman went in tug to Chattam to procure from a dredge at that place a pinion wheel instead of the one broken. There being but one dredge at work, I allowed Mr. Pexton to act as pilot. Worked until near 10 p. m.; at this time the wind blowing fresh from northwest, and the men having to pole the dumpers out in the absence of the tug, the work was stopped. This has been the best day's work yet done; passed red buoy No. 4.

Number of dumps this day, 20, (of which 14 from No. 2;) number of cubic yards excavated, 856.

*Tuesday, July 7.*—Wind from the northwest; fine, clear wheather; commenced work at daylight. At 7 a. m. tug returned with pinion wheel, dredge No. 1 commenced working about 9 a. m. About 8 p. m. a severe squall sprung up from the northeast, and continued somewhat more than half an hour, accompanied by the heaviest rain I think I ever saw; all hands in fear of the canal boat being blown away or swamped; one scow, ready to be towed out for dumping, was dumped some twenty feet to the south of the channel to prevent her from sinking; the gale, when at the highest, changed suddenly

around to the northwest, causing a cross-sea that threatened destruction to the dredges; the balance of the afternoon calm and clear. The old dipper-handle was taken out of No. 2, and the new one put in; worked with No. 1 until 6 p. m. Tug out of wood; went to Algonac for some.

Number of dumps this day, 10; number of cubic yards excavated, 429.

With the exception of three loads from No. 1 dredge, (which, on account of loss of time, is now behind No. 2,) all the material excavated during the day is of a mixed character; coarse sand predominating; fine sand and a little dark clay mixed, in layers, through the coarse sand. The dipper tenders tell me it is very hard to dredge; but on reaching the surface of the water it presents to me no appearance that would indicate any such difficulty. It is a little stiff; but on taking a handful as it came from the dipper I easily washed the clay away, and the residue (the principal part of the bulk) was a very fine sand; a little fine gravel was scattered through the coarse sand. I took the small boat to-day and sounded the cut; I found a very irregular bottom, running from ten to fourteen feet below the surface of the water; this portion, I think, must be gone over again. I made the necessary representation to the foreman. Mr. Barton arrived here to-day in a tug; he towed up another dumper for a wood boat; left again in a few minutes for Detroit.

*Wednesday, July 8.*—Wind from the northeast; fair. The tug, on account of a dense fog in the river, did not return until 10 a. m.; but one dump poled out during its absence. Only one dredge at work to-day, No. 1.; dipper handle for No. 2 not yet in readiness; material of the same nature as that of yesterday. One stub of dredge No. — was broken to-day; 4 p. m. foreman went to Algonac to procure another. Mr. Barton's new tug, "St. Mary," passed up to-day on her way to the Sault Ste. Marie.

Number of dumps, 8; number of cubic yards excavated, 351.

I took Mr. Pexton in the boat with me this afternoon, and, with difficulty, recovered the stakes blown over yesterday; they were lying on the bottom; we replaced them in line. I am of opinion that at least two more permanent channel marks ought to be set, one at each end of the line of dredging; as, should there be such another or heavier blow as was experienced yesterday, the present stakes would doubtless all be carried away from their true position, causing serious inconvenience to the work. Luckily, we found the stakes on the extreme ends of the channel standing.

*Thursday, July 9.*—Commenced dredging at daylight with No. 1 dredge; 9.30 a. m., with No. 2. Wind from east, light; fine, clear weather. At 2 p. m. a scow from Algonac arrived with wood; piled it on scow almost to water's edge; balance, some fourteen cords, piled on roof of canal boat. The first wind will very probably carry away the whole of the wood. No. 2 had her dipper chain broken twice; got it mended each time with but little delay. Both machines were worked until 11 p. m., when dredge No. 1 broke a spud; continued dredging with No. 2 all night; had nothing to show for the twenty-four hour's work when compared with Monday's. In the early part

of the night, before the moon rose, there was a very thick fog; could scarce see the length of the dredge; placed lanterns on each of two stakes as guides; had great difficulty in finding the stakes. Mr. Pexton "turned in" at 12 p. m.; I remained up all night.

Number of dumps, to 4 a. m., Friday, 20; amount of material excavated, cubic yards, 822.

*Friday, July 10.*—4 a. m., continued working with No. 2 dredge; 8 a. m., tug went to Algonac with foreman to procure coal and a second spud in place of the one broken. Afternoon perfectly calm; had a few light cedar beacons and a line for measuring distance; I would sound the cut to-day and furnish a correct chart of it; tug returned from Algonac at 4.30 p. m.

Number of dumps this day, 11; number of cubic yards excavated, 466.

*Saturday, July 11.*—Morning calm; fine clear weather; commenced dredging at daylight, No. 2 dredge alone working; No. 1 commenced working at 4 p. m.; ceased work at 9 p. m. Steam tug "Gore" passed down to-day with a large raft, and carried away No. 2 beacon.

Number of dumps, 12; number of cubic yards excavated, 483.

*Sunday, July 12.*—Day calm and hazy; no work; tug "Eagle" arrived from Detroit at 5 p. m.; the damages by fire fully repaired.

*Monday, July 13.*—Morning calm and foggy; dredges worked well to-day; two sounding poles were brought up yesterday by the tug for government purposes; 12 cedar posts, to be used instead of the present stakes, were brought up by steamer "Forester" to-day; wind at sunset from southeast with heavy swell; ceased working at 9.15 p. m.

Number of dumps, 20; number of cubic yards excavated, 844.

*Tuesday, July 14.*—Heavy swell from southeast; light wind; commenced work at daylight; sent report to Captain Whipple per "Dart;" dredge No. 1 ran out of the line at 1 p. m.; got her into proper place without delay; broke down at 4.30 p. m.; idle rest of afternoon. Continued dredging with No. 2 until 6.30 p. m. Began to blow fresh from southeast; heavy swell; canal boat dragged anchor; at 7 p. m. brought up in better holding ground. The material excavated to-day is stiffer than any dredged yet; it adheres to the scows and causes delay in dumping.

Number of dumps, 19; number of cubic yards excavated, 787.

*Wednesday, July 15.*—Morning fair; light wind, east by south; water perfectly smooth. Commenced work at daylight; dredge No. 1 at work this morning; steam tug "Gore" passed with raft at 7.30 a. m. Both dredges broke down between 8 and 9 a. m.; No. 2 went to work in about an hour; had something wrong with her dipper. No. 1 broke her shaft; had it temporarily fixed about 3 p. m., but broke down again at 6 p. m. Foreman went to Detroit in forenoon to get another shaft. This afternoon had one of the large channel buoys hauled into line of stakes; about 2 p. m. set such stakes in line as were out of position. Clouded up at 4.30 p. m.; at 6 p. m. blew fresh; water rough; ceased work at 8.30.

Number of dumps this day, 16; number of cubic yards excavated, 665.

I sounded astern of the dredges to-day and found they were doing

better work than previously; the bottom is more uniform, and there is 14 feet of water. It requires much vigilance to prevent the foremen of the dredges from taking a zigzag course; they either run too close to the stakes or keep an unnecessary distance from them. I have repeatedly told them to allow from 8 to 10 feet, but not more. If they run closer, the stakes will fall down the slopes of the cut. The men are negligent and require constant watching.

*Thursday, July 16.*—Morning cloudy and dark; light wind from NE. Dredge No. 1 at work again; scows leaking; carpenters at work repairing them; 11 a. m., wind changed to NW., light; at noon calm and very hot. Towards sunset wind again sprung up from NE., light. Ceased working at 9 p. m.; tug started for Algonac, after work was stopped, for a new dipper handle. Night dark; one dumper had a roller broken; can have but one hopper loaded.

Number of dumps this day, 21; number of cubic yards excavated, 882.

*Friday, July 17.*—Morning clear and calm. Commenced working at daybreak. Tug returned at 6.15 a. m., without dipper handle. Both dredges broke down at 9 a. m. Dredge No. 1 resumed work at 10.30 a. m.; she leaks badly. Noon, wind rising from NW.; cloudy, threatening weather; 2 p. m., changed to SE. and was variable all afternoon; 4 p. m., squall from NW.; blew hard. Heavy rain, thunder and lightning continued until 8 p. m. Blew fresh all night.

Number of dumps this day, 8; number of cubic yards excavated, 310.

*Saturday, July 18.*—Wind westerly; water rough. Commenced work at daylight. This morning chloride of lime was scattered through the canal boat; very much needed. Calmed down before noon. Fine working day; but one dredge at work (No. 2.) The crew of No. 1 employed in stopping leak and getting ready the new dipper handle. 2.30 p. m., scow with wood from Baltimore; very lucky, as there was none on hand. 9 p. m. ceased work; night dark and wind freshening.

Number of dumps this day, 12; number of cubic yards of material excavated, 495.

*Sunday, July 19.*—Forenoon calm; men at work repairing No. 1 dredge; tug gone to Algonac for coal; returned 6 p. m. Blew fresh in afternoon.

*Monday, July 20.*—Sunrise, light wind from the NW.; heavy swell from lake. Dredge No. 1 working at 8.30 a. m.; No. 2 (leading) is now opposite "William's piling;" 12 m., squall from NW., lasted about half an hour; rain. Heavy squall with rain, from NW., at 2 p. m., continued all the afternoon; blew hard; heavy sea. Ceased working, and winded dredges; canal boat drifted towards Canada shore; brought up by tug.

There are but three anchors for the whole fleet of nine vessels. Each should have an anchor, and in squalls be independent of each other. The canal boat has a wood-scow attached, and is held by an anchor of about 300 lbs.

Number of dumps, 10; number of yards excavated, 430.

*Tuesday, July 21.*—Heavy sea from the NW. No work this morn-

ing. Dark and cloudy throughout day; rained. Commenced dredging with both machines at 12 m.

Evening.—Squalls from NW. Closed work at 7.30 p. m.

Number of dumps, 6; number of cubic yards excavated, 241.

*Wednesday, July 22.*—Dark, cloudy weather. Blew fresh all day until 5 p. m. Commenced dredging at 5.26 p. m.; ceased at 7.30.

Number of dumps, 4; number of cubic yards excavated, 179.

*Thursday, July 23.*—Wind from NE. Morning cloudy. Commenced dredging at sunrise. I find that No. 2 is dredging a better channel than No. 1, the depth more uniform; whereas No. 1 has 14, 15, and 16 feet. The 16-foot cut is not extensive, being only a few dippers full. I remeasured 14 feet deep on the dipper handles and told the tenders to dredge to that depth, or as near as possible.

Squall from northward with heavy rain at 4.40 p. m., lasted about half an hour. Best day's work yet done; no time lost, and scows well filled. Ceased dredging at 9 p. m.; night cloudy and dark. Mr. Pexton went out with the last dumpers, and on return reported that the stakes marking the boundary of deposits could not be seen. He thinks the material was not deposited at the proper distance. The engine of No. 2 being out of order, the foreman had it taken out when work was over, and set men to work at it during the night.

Number of dumps, 23; number of cubic yards excavated, 994-5.

The material excavated by the dredges differ in quality; that dredged by No. 1 is principally coarse sand, that by No. 2 is mixed with fine sand and mud. The leading dredge is working in the old cut. The tender complains of the hardness of the bottom.

The day's work has been very satisfactory, and from the amount of work done shows that when both dredges are worked steadily during the day one thousand cubic yards can be got out.

*Friday, July 24.*—Morning cloudy; commenced work at daylight with both dredges. Mr. Pexton splicing ropes, &c., for buoys. 3.40 p. m., No. 2 engine again out of order; foreman had it taken out, and had men working at it all the afternoon and far into the night. Scow from Algonac with wood. Night dark; ceased working at 9 p. m.

The material dredged up to-day was a mixture of coarse sand and a very fine soft black sand; there was a little clay visible, some shells were scattered through it.

Number of dumps this day, 18; number of cubic yards excavated, 787.

*Saturday, July 25.*—Commenced dredging at daylight; morning calm and beautiful. Two scows were dumped this morning at 5.30, earlier than any morning previous; twelve boats got out by noon. Day continued fair and warm; wind at sunset from southwest, freshened a little at 9 p. m. The aurora borealis was visible immediately after the sun went down. A dark bank of cloud, forming an arch, extended from northeast to northwest. Above this was a beautiful mellow light, through which were vertical rays of silver color to about thirty degrees above the horizon, the whole occasionally brilliantly illuminated by flashes of white light. It looked very beautiful. The wood expected from Algonac to-day did not arrive; out of fuel.

Number of dumps this day, 28; number of cubic yards excavated, 1158.5.

*Sunday, July 26.*—Morning calm; swell from SW. Men at work at engine of No. 2 dredge, stopping leak in boiler, &c. Mr. Pexton and myself turned out at 5 a. m., and set some new cedar buoys between the northeast end of the cut and the row of piling. We placed them about two hundred feet apart. I think these buoys will serve better than the stakes; but yet they don't answer as well as I expected, the current causing them to lean over. We did this much work, being tempted by the calmness of the weather, and the opportunity afforded by the dredges lying idle. Yesterday the carpenter was set to work tearing down the old bunks and placing a partition across that part of the boarding house hitherto used for eating and sleeping in; the improvement is decided, the men's sleeping place being now separated from the eating apartment. Tug went to Algonac for wood and coal; returned at 11 p. m.

*Monday, July 27.*—Weather at sunrise rough; heavy sea; wind from SW. Men turned out to work at about 3 a. m.; succeeded in loading two boats, one load was dumped in the channel about two hundred feet west of the dredges to prevent the boat from sinking; the sea rolled over her, the contents were not allowed. Seven a. m. wind freshened; winded the dredges and ceased work. Foreman went to Baltimore in the tug to make arrangements for procuring wood more regularly. Wind blowing fresh all the afternoon; heavy sea from SW.; canal boat rolling like a barrel. Tug returned at 4.30 p. m. At sundown wind rising; blew a gale all night. No accident occurred to any of the fleet.

Number of dumps this day, 1; number of cubic yards, 44.

*Tuesday, July 28.*—Wind changed during night to the northward; at sunrise, blowing hard, with heavy sea; no dredging. Foreman went to Detroit to-day for provisions, &c.; also, to endeavor to hire a small dredge lying at Detroit. I am opposed to this plan, and so stated in a report to Captain Whipple this morning. Wind going down at 4 p. m., commenced dredging; No. 2 dredge got out one boat, and then had pillow block broken; idle rest of afternoon; sundown, light breeze from southward.

Number of dumps, 5; number of cubic yards excavated, 222.

*Wednesday, July 29.*—Morning clear, wind westerly; commenced work at daylight; No. 2 not yet ready for work. Foreman returned from Detroit; declares the dredge at Detroit useless. 9 a. m., No. 2 dredge at work; 1 p. m., pillow block again broken; had to take engine asunder and repair. Wind blew fresh during afternoon. Closed work at 8.50 p. m.

Number of dumps this day, 14; number of cubic yards excavated, 597.

*Thursday, July 30.*—Wind from SW., fresh; commenced work at daylight. One man discharged this morning for neglecting work; reported to foreman by Mr. Pexton. No. 1 broke down about 12 m.; remedied about 2.30 p. m. Having a few hours of calm weather, I sounded the cut from end to end. Wind blew fresh about 4 p. m., increasing during the night to nearly a gale. Winded the dredges; No. 2 dredge got to work at 3 p. m. There is a dispute about the



last two scow loads; it grew dark before they could be taken out; Mr. Pexton accompanied them; on his return he stated that they were dumped at not more than 300 yards from the channel; the wheelsman and engineer of the tug state that they saw the stakes and the material dumped at the required distance; I have included them in the total amount dredged during the day, leaving them to be allowed or not, according to the decision of the officer in charge.

Number of dumps, 15; number of cubic yards, 667.

The questionable loads are 46 and 38 cubic yards, respectively.

*Friday, July 31.*—Heavy weather; wind from SW.; blew nearly a gale up to 5 p. m., then suddenly fell, and then changed round to NE.; blowing fresh. No work done except some needful repairs to dredges and scows. 9.30 p. m., wind moderated somewhat. Night dark and cloudy.

*Saturday, August 1.*—Morning calm; water smooth. Commenced work at 2.30 a. m.; a good beginning for the month; hope it will continue. Scow from Baltimore with wood at 9 a. m. I took all the opportunity to-day, assisted by two of the contractor's men, to sound the cut dredged during last month; I sounded one line in the centre of each cut, one between the cuts, and diagonally at the distance of about 100 feet. The day continued calm to the time of ceasing work, 11 p. m.

The material dredged to-day was coarse, and coarse and fine sand mixed.

Number of dumps, 32; number of cubic yards, 1,367.

*Sunday, August 2.*—Morning calm and fine. Plotted soundings to-day, and wrote monthly report for July. Had the dredges change places, putting No. 1 in front. The tender of No. 2 dredge is very careful; we placed it in rear to dredge off the ridges left by No. 1, if any. Day continued fine. This afternoon I noticed that one of the channel buoys (red) is out of line; will have it properly placed to-morrow.

*Monday, August 3.*—Morning calm and fair. Commenced dredging at daybreak; 10.30 a. m., steamboats "Dart" and "Forester," from and to Detroit, passed the dredges. We were returning with empty dumpers at the time, and had to stop near the channel to allow them to pass. Captain Whipple arrived in tug "Franklin Moore" to inspect last month's work. I handed in report of operations during past month; proved satisfactory. I referred the dispute alluded to on July 30th to Captain Whipple. His decision is, that from the fact that the wheelsman of the tug said he saw the stakes, and Mr. Pexton being in doubt as to the distance at which the boats were dumped, together with my recommendation, the contents of the scows are allowed. Captain Whipple took small boat, and, with self and others, took soundings in cut; gave me general instructions for my guidance during month; 4 p. m. returned with Captain Whipple to Detroit in tug. Previous to my departure, the number of boats got out was 17; Mr. Pexton (left in charge) reports seven more during the afternoon. Wind blowing fresh from southwest; stopped work on account of it at 7 p. m.

Number of dumps this day, 24; number of cubic yards excavated, 1,077.

*Tuesday, August 4.*—I remained in Detroit all day, procuring some articles necessary on the work. Hired a carpenter to be in readiness in morning to go to the flats to make buoys, &c. Mr. Pexton's report of operations at the flats to-day is as follows: "Morning calm and fine; rain through the day; 6 p. m. blowing fresh from northward; ceased working."

Number of dumps, 14; number of cubic yards, 609.5.

*Wednesday, August 5.*—Wind from northeast; blowing hard; no work. Arrived at flats at 11 a. m., accompanied by the carpenter. Some men, to make up a double crew, for working dredges at night, came up to-day. Mr. Pexton gone to Detroit this afternoon. Blew fresh all day from northeast.

*Thursday, August 6.*—Morning calm and moonlight; water perfectly smooth; dredges at work at 2.30 a. m. Captain Whipple arrived at flats at 12 m. to investigate a charge made by Mr. Ward, of steamer "Forester," that an obstruction was placed in the channel by some persons connected with the dredging. We took soundings in the channel, and found not less than  $8\frac{1}{2}$  feet of water; no obstruction. Captain Whipple left for Detroit at 2 p. m. Employed Mr. Polglase to assist in the place of Mr. Pexton. Continued calm all day. At 11 p. m. wind rose from southward; continued working. The material excavated to-day is nearly all mud; very difficult to dump it.

Number of dumps, 27; number of cubic yards, 1,177.

I set another buoy near the lake to-day.

*Friday, August 7.*—Continued dredging until 20 minutes past midnight; took out two dumps since 12 p. m.; morning bright and clear; blowing fresh from southward; winded dredges; set to work again at 11.30 a. m.; slight breakages on both dredges during the day, such as backing, dipper and turn table chains; tug R. R. Elliott ran aground during the blow this morning at the bend near the mouth of the river; she sent to us for yawl; the day was not very favorable for work; too much sea; towards evening calmed down; placed lanterns on stakes, as usual, when dredging at night, and worked till midnight; number of dumps, 16; number of cubic yards, 698; material, sand and mud.

*Saturday, August 8.*—Continued working since midnight; morning calm and moonlight; dredge No. 2 loses time; her boiler leaks and can't make steam quick enough; during the day both dredges had slight break downs; 5 p. m. blew fresh from northward, with rain; ceased dredging at 6 p. m.; material excavated, sand and mud; number of dumps, 14; number of cubic yards, 561.

*Sunday, August 9.*—Wind light, from north; clear; men repairing machinery of No. 2; one of the stakes on the dumping line was blown down last night and replaced to-day; afternoon calm and clear; sunset, wind from southeast; cloudy.

*Monday, August 10.*—Commenced working with No. 1 at 1 a. m.; weather calm but cloudy; 4 a. m., dipper chain broken; 6 a. m., No. 2 at work; light breeze from southeast; at about 1 p. m. one of the

severest squalls we have had came down on us from the northward, accompanied by heavy rain; the channel boat dragged its anchor, and two scows broke adrift from the dredges; they were, however, towed back by the tug; cleared off about 3.30 p. m., when work was resumed; thinking that the canal boat anchor was foul of its chain, the foreman had it weighed, whereupon it was discovered that during the squall it had broken short off near the stock; we have now in its place the anchor of No. 1 dredge, and it is almost useless in a blow, it is so small; 9.30 p. m., light breeze from northwest, and very dark; placed lanterns on the stakes and worked till 12 p. m.; No. 2 dredge had a bad break down about 11.30 p. m.; the whole of the crane, dipper, and handle are at the bottom of the cut; the dipper-tender had a narrow escape; he was standing on the turn table, and that going with the rest, he went with them; he could not swim, but managed to scramble out some how. Number of dumps this day, 17; number of cubic yards excavated, 698.

*Tuesday, August 11.*—Wind light from northward; continued dredging with No. 1 since midnight; could do nothing in the dark towards regaining the crane of No. 2; waited for daylight; ceased working No. 1 at 5.30 a. m., and had her towed back to No. 2 to aid in raising the crane. Day perfectly calm and exceeding hot; "Forester" passed on her up trip at 10.30 a. m.; her wheels were stopped whilst passing the dredges; I don't know whether it was courtesy or precaution; the crane was raised, and No. 1 towed to her proper place in the cut at 7.15 p. m. Wind rising from northeast, I took the boat and sounded in front of dredges this afternoon; found 14½ feet water within 200 feet of leading dredge, and towards the lake. The dredges are now excavating in 8½ feet water; the material, sand and mud; tried to work a little with No. 1 on getting her into place, but broke a wheel on crane; repaired by 12 p. m. Fresh wind from southeast; blew away tug, canal boat, and wood scow, (all made fast to one small anchor;) they drifted to the northwest about 500 yards; got all back safe.

Number of dumps, 3; number of cubic yards, 98.

*Wednesday, August 12.*—Wind blew fresh all the morning, and continued so all day and night from southeast; tug went to Baltimore to bring up the wood; towed back a scow with wood and coal at 4 p. m. No work to-day.

*Thursday, August 13.*—Wind from westward; no work this morning; blows hard, with heavy sea; last night the dipper handle of No. 1 was taken out for repairs; put in again at 8 p. m. this evening. Forester brought from Detroit to-day an anchor for canal boat and six cedar posts, 10 inches in diameter, for buoys; the latter I ordered from Detroit. Mr. Polglase sawed them into lengths of 18 inches, and then bored them with a two-inch augur, so that small stakes could be run through them, after the manner instructed by Captain Whipple. The wind veered during afternoon a little more to southward, and at sundown moderated, but it still blew fresh. No work done to-day.

*Friday, August 14.*—Sunrise; strong wind from southwest; no dredging; another severe squall from northwest struck us at 2 p. m.;

continued about half an hour; the wind then changed to northeast, blowing fresh; moderate at 5 p. m.; commenced dredging at 5.30 with No. 1. The crew of No. 2 can't make steam fast enough to keep her working; it blew pretty much until 9 p. m., when it calmed down; rained balance of night; the darkest night I ever saw.

Number of dumps this day, 6; number of cubic yards, 259.

*Saturday, August 15.*—Midnight, wind from NE., moderate, with rain; dredge No. 2 idle from 1.30 to 4 a. m.; no steam; 4 a. m., wind freshened and again moderated at daybreak, when rain ceased; 8.30 a. m., No. 1 broke chain wheel; No. 2 managed to get out a few boats, but her boiler leaked so badly it was wasting fuel to work her; the material is so stiff it clings to the scow; the tug has to stop many minutes to let it dump. No. 1 on breaking the wheel lay idle from 8.30 a. m. till 2.30 p. m.

Number of dumps this day, 14; number of cubic yards excavated, 598.5.

*Sunday, August 16.*—Wind from northward; forenoon rough; afternoon blew strong, with rain; very rough sea; tug went to Algonac at 1 p. m.; I went with her; returned at 7.30 p. m. Blew fresh all night.

*Monday, August 17.*—6 a. m., blowing a gale from westward, forenoon; discharged five men to-day. They were not wanted on account of the weather; wind changed at 9 a. m. to northward; heavy sea. No dredging done to-day.

*Tuesday, August 18.*—Wind at sunrise from northward; light breeze and cloudy. Commenced dredging with No. 1 at 5.30 a. m.; No. 2 no steam until 6 a. m.; 11 a. m. perfect calm; 4 p. m. turn table chain of No. 1 broken; repaired in fifteen or twenty minutes; No. 2 broke one of her spuds; continued working with other two; 8 p. m. wind from NW. blowing hard, with rain; ceased work at 9.30 p. m.

Number of dumps this day, 17; number of cubic yards excavated, 745.

*Wednesday, August 19.*—No work this morning, strong wind from SW.; schooner "Fox," of Lake Navigation Company, ran aground during the night about 200 yards to the southward of the cut; was endeavoring to make north channel; she was taken off this morning by two of the company's tugs. Tug went to Algonac at 10 a. m. for spud for No. 2; returned with it at 5.40 p. m. Blew fresh all day; no dredging done.

*Thursday, August 20.*—Wind this morning light, from northward; 11 a. m. calm; commenced dredging with No. 1; the boiler of No. 2 was taken out for repairs; a boiler maker and blacksmith arrived from Detroit. Although the wind was light, the water was too rough to dredge until the time above noted; 6 p. m. light wind from SW.

Number of dumps this day, 7; number of cubic yards excavated, 308.

*Friday, August 21.*—Continued dredging during night; wind moderate. At about noon No. 1 dredge (the only one working,) got into 14 feet water. She was then swung around, and dredged alongside of previous cut, so as to meet No. 2, that both may be towed together to commence the second, to the above end of the channel; 2.25 p. m., blowing fresh from SE.; ceased working; winched dredges. The material to-day was very soft, greasy, fine sand, mixed with grass, &c.

Number of dumps, 7; number of cubic yards excavated, 280.

*Saturday, August 22.*—Blew a gale all last night, accompanied by rain and thunder. Very rough sea. At 6 a. m., No. 1 dredge tore away from all her spuds, and was carried by wind and sea to the northeast. The tug was unable to go after her immediately, on account of difficulty in weighing her anchor—the windlass was broken in doing so. She had to slip cable and run. By this time the dredge was drifting through the rushes to the northeast, in the direction of the middle passage, having five or six men on board. The rest of the property rode out the gale in safety. One of the spuds of No. 1 is standing in 14 feet water, with perhaps five feet of it over water. It being 30 feet long there must be at least six or eight feet of it buried in the sand or mud. The second dredge escaped the casualty which occurred to the first, as she was lying in nine feet water, and consequently the strain was much less on her spuds. The scows belonging to No. 1 broke their fastenings and took their own courses in the direction of Baltimore. It blew hard all day. The tug returned at 2 p. m.; reports that she could not get within less than two miles of the dredge. She got the men, however, as, having a small boat, they deserted the dredge in the rushes and steered to Baltimore, where the tug found them. At 6 p. m., the wind again rising, the tug fastened on to the fleet and made for the river. Luck again turned somewhat against us, and the tug ran aground in four feet of water at the bend, near the barrel buoys. We dropped anchor in the channel and waited for morning to get into the river. Although a little sheltered from the sea, we were anything but comfortably situated. I essayed to write my journal, (it being a blank since Thursday;) but, owing to the wind blowing at right angles to a very strong current, the boat had a double motion—headways and sideways—and I could not succeed. No dredging this day.

*Sunday, August 23.*—Wind from southwest, stronger than on yesterday. Tug backed off into the deep water, took fleet again in tow, and anchored in shallow water in the river. Wind blew a storm all day, and exceedingly cold. 4 p. m., tug started for Algonac to order spuds for dredge No. 1. Wind moderated about 12 p. m.

I was enabled to post up my journal to-day.

*Monday, August 24.*—Morning, at sunrise, clear—light wind. Tug did not arrive until 10 a. m.; towed back fleet to cut. All this fine morning lost. The tug should have returned on last night, to be in readiness to tow the dredge into her place by sun rising this morning. A large cable and anchor was brought up from Detroit to-day. About time to know its value.

The tug was sent to try and get No. 1 dredge back, and succeeded in towing her into Baltimore, where she will be repaired. Tug returned at 9.30 p. m. On account of the depth of water where No. 2 is dredging, (about nine feet,) she has to move a number of times to fill a dumper, consequently does but little during the day.

Number of dumps, 3; number of cubic yards, 131.

*Tuesday, August 25.*—Morning calm; no dredging until 6.15 a. m. I found a part of spud of No. 1 standing in the sand near the one mentioned yesterday, the top of it is under water. At 1.30 p. m. tug

went to Baltimore to fetch the dredge; returned with it about 8 p. m. Blew fresh from SW. during the night. The lost dumpers are fast in the rushes, the doors down.

Number of dumps this day, 9; number of cubic yards, 366.

*Wednesday, August 26.*—Blowing fresh from SE.; No. 1 dredge undergoing some repairs. Afternoon, men went in the yawl to float off the dumpers; succeeded; tug towed them in; got out but two boats to-day. at 5.40 p. m.; blew fresh; ceased dredging.

Number of dumps, 2; number of cubic yards, 87.

*Thursday, August 27.*—Wind this morning from SE.; water rough; 12.30 p. m., wind increasing; 8 p. m., severe storm, with rain and thunder; wind from SW.; stormed all night. No work.

*Friday, August 28.*—Wind at sunrise from SW.; blowing fresh; heavy sea; continued so all day, with squalls and rain. Dredges ride well, attached to large anchor. The boiler of No. 2 could not be repaired here; she was towed to Detroit by tug at 3 p. m.; foreman and Mr. Polglase went with her. Blew a gale all night. No dredging done.

*Saturday, August 29.*—Blowing fresh from NE. this morning. I forgot to mention that on Thursday one dredge was employed for a time in raising the sunken spuds of No. 1; two stout chains were broken in doing so; raised both the spuds. Strong wind all day. At sundown the wind fell away, and at 10 p. m. the water was perfectly calm. It took some time to find the face of the cut of No. 2, as the buoy dropped there shifted. One boat was loaded and another partly, but were not dumped during the night, as a fresh breeze sprung up from the SW. about 2.30 a. m.

*Sunday, August 30.*—Wind from SW.; moderate; 8 a. m., commenced dredging; the men poled the boats out in the absence of the tug. A strong wind sprung up at noon and nearly swamped a loaded scow; she was dumped, to save her, alongside the cut and to the north of it. But two boats were poled out; the second one, when dumped, became unmanageable on account of the wind. An anchor was brought out to us, and we warped her to the dredge. Ceased working at 12.30 p. m.

Number of dumps this day, 2; number of cubic yards, 86.

We could have worked all the afternoon had the tug been here, but with what wind there was the men could not pole out the boats; and there was no use in loading them, as they would leak out a large portion of their contents into the cut again.

*Monday, August 31.*—Fresh breeze from SW. No dredging to-day. If the tug had been here we could have worked all day. "Sam Ward," "Forest Queen," and "Dart" passed here to day *through the cut*, sucking up the loose sand from the bottom. Tug arrived from Detroit with No. 2 dredge at 8 p. m., and started again for Baltimore at 9.30. Night clear and calm. Mr. Polglase arrived on tug.

The total number of cubic yards of material excavated during  
the month of July is ..... 14,159  
August..... 9,261

Total ..... 23,420







No. 3—Continued.

Date.	Hour.	Material.	Number of loads.	Number of yards.	
July 6, 1857-----		Coarse sand-----	1	44	
		Do -----	1	44	
		Do -----	1	40	
		Do -----	1	44	
		Do -----	1	43	
		Do -----	1	42	
		Do -----	1	43	
		Do -----	1	42	
		Do -----	1	42	
		Do -----	1	40	
		Do -----	1	38	
		Do -----	1	42	
July 7, 1857-----		Coarse sand-----	1	43	856
		Sand and clay and gravel-----	1	43	
		Do -----	1	43	
		Do -----	1	43	
		Sand and clay-----	1	43.5	
		Do -----	1	44	
		Do -----	1	40	
		Do -----	1	43.5	
		Do -----	1	44	
		Do -----	1	42	
July 8, 1857-----		Sand and clay-----	1	44	429
		Do -----	1	40	
		Do -----	1	46	
		Do -----	1	46	
		Do -----	1	44	
		Do -----	1	42	
		Do -----	1	44	
		Do -----	1	45	
July 9, 1857-----		Sand and clay-----	1	43	851
		Do -----	1	44	
		Fine sand and some clay-----	1	43	
		Do -----	1	42	
		Do -----	1	44	
		Do -----	1	42	
		Do -----	1	44	
		Do -----	1	43	
		Do -----	1	45	
		Do -----	1	40	
		Do -----	1	44	
		Do -----	1	42	
		Fine sand-----	1	25	
		Do -----	1	40	
		Do -----	1	42	
		Do -----	1	40	
		Do -----	1	42	
		Do -----	1	43	
		Do -----	1	44	
		Do -----	1	30	
July 10, 1857-----	6.30 a.m.	Sand and mud-----	1	44	822

## No. 3—Continued.

Date.	Hour.	Material.	Number of loads.	Number of yards.	
July 10, 1857----	6.30 a.m.	Sand and mud -----	1	43	
		Do.-----	1	43	
		Do.-----	1	44	
		Do.-----	1	44	
		Do.-----	1	45	
		Do.-----	1	45	
		Do.-----	1	42	
		Do.-----	1	38	
		Do.-----	1	40	
		Do.-----	1	38	
July 11, 1857-----		Sand and mud and clay -----	1	44	466
		Do.-----	1	44	
		Do.-----	1	40	
		Do.-----	1	40	
		Do.-----	1	37	
		Do.-----	1	38	
		Do.-----	1	44	
		Do.-----	1	38	
		Do.-----	1	40	
		Do.-----	1	37	
		Do.-----	1	38	
		Do.-----	1	43	
July 13, 1857-----	8.00 a.m.	Sand and clay -----	1	43	483
	8.20 a.m.	do.-----	1	41	
	9.35 a.m.	do.-----	1	44	
	2.40 p.m.	do.-----	1	40	
	1.15 p.m.	do.-----	1	42	
	9.05 a.m.	do.-----	1	45	
	10.00 a.m.	do.-----	1	45	
	10.40 a.m.	do.-----	1	42	
	11.25 a.m.	do.-----	1	43	
	3.10 p.m.	do.-----	1	43	
	1.15 p.m.	do.-----	1	38	
	4.00 p.m.	do.-----	1	40	
	4.53 p.m.	do.-----	1	40	
	4.00 p.m.	do.-----	1	43	
	8.15 p.m.	do.-----	1	40	
	5.45 p.m.	do.-----	1	46	
	6.10 p.m.	do.-----	1	40	
	7.10 p.m.	do.-----	1	45	
	7.10 p.m.	do.-----	1	43	
	8.15 p.m.	do.-----	1	42	
July 14, 1857-----	6.15 a.m.	Sand and clay -----	1	44	844
	6.15 a.m.	Very stiff -----	1	44	
	7.00 a.m.	do.-----	1	40	
	8.05 a.m.	do.-----	1	45	
	8.05 a.m.	do.-----	1	44	
	9.30 a.m.	do.-----	1	42	
	9.30 a.m.	do.-----	1	44	
	10.30 a.m.	do.-----	1	40	
	11.30 a.m.	do.-----	1	46	
	11.30 a.m.	do.-----	1	44	
	1.30 p.m.	do.-----	1	43	
	2.30 p.m.	do.-----	1	43	

No. 3—Continued.

Date.	Hour.	Material.	Number of loads.	Number of yards.	
July 14, 1857----	2. 30 p.m.	Very stiff-----	1	44	787
	3. 20 p.m.	-----do-----	1	45	
	3. 20 p.m.	-----do-----	1	43	
	3. 20 p.m.	-----do-----	1	42	
	5. 00 p.m.	-----do-----	1	42	
	5. 25 p.m.	-----do-----	1	44	
	6. 30 p.m.	-----do-----	1	18	
July 15, 1857----	6. 00 a.m.	Sand and clay-----	1	38	665
	6. 35 a.m.	-----do-----	1	40	
	7. 47 a.m.	-----do-----	1	44	
	7. 47 a.m.	-----do-----	1	45	
	8. 25 a.m.	Coarse sand-----	1	44	
	10. 10 a.m.	-----do-----	1	44	
	11. 20 a.m.	Sand and gravel-----	1	40	
	1. 25 p.m.	-----do-----	1	42	
	1. 52 p.m.	Fine sand-----	1	40	
	3. 40 p.m.	-----do-----	1	43	
	4. 50 p.m.	-----do-----	1	46	
	4. 50 p.m.	Fine sand and mud--	1	32	
	5. 50 p.m.	Coarse sand-----	1	38	
	6. 40 p.m.	-----do-----	1	47	
	7. 00 p.m.	-----do-----	1	40	
	8. 30 p.m.	-----do-----	1	42	
July 16, 1857----	6. 00 a.m.	Coarse sand-----	1	42	883
	6. 40 a.m.	-----do-----	1	44	
	8. 26 a.m.	-----do-----	1	43	
	8. 55 a.m.	-----do-----	1	42	
	9. 28 a.m.	Coarse and fine sand--	1	37	
	10. 23 a.m.	-----do-----	1	42	
	11. 00 a.m.	-----do-----	1	45	
	12. 25 p.m.	-----do-----	1	44	
	12. 25 p.m.	-----do-----	1	42	
	1. 10 p.m.	-----do-----	1	44	
	1. 45 p.m.	-----do-----	1	40	
	2. 15 p.m.	-----do-----	1	44	
	3. 05 p.m.	-----do-----	1	43	
	4. 00 p.m.	-----do-----	1	43	
	4. 40 p.m.	-----do-----	1	43	
	4. 40 p.m.	-----do-----	1	24	
	5. 15 p.m.	-----do-----	1	44	
	7. 10 p.m.	-----do-----	1	50	
	7. 10 p.m.	-----do-----	1	42	
	8. 35 p.m.	-----do-----	1	43	
	8. 35 p.m.	-----do-----	1	42	
July 17, 1857----	6. 46 a.m.	Coarse and fine sand--	1	45	310
	7. 18 a.m.	-----do-----	1	42	
	8. 05 a.m.	-----do-----	1	43	
	7. 30 p.m.	-----do-----	1	42	
	10. 43 a.m.	-----do-----	1	26	
	12. 00 m.	-----do-----	1	45	
	1. 25 p.m.	-----do-----	1	45	
	4. 20 p.m.	-----do-----	1	22	
July 18, 1857----	6. 30 a.m.	Coarse and fine sand--	1	45	
	8. 00 a.m.	-----do-----	1	34	

## No. 3—Continued.

Date.	Hour.	Material.	Number of loads.	Number of yards.	
July 18, 1857----	8.30 a.m.	Coarse and fine sand--	1	42	495
	9.00 a.m.	do-----	1	35	
	10.05 a.m.	do-----	1	42	
	11.00 a.m.	do-----	1	44	
	12.00 m.	do-----	1	40	
	1.10 p.m.	do-----	1	38	
	2.05 p.m.	do-----	1	44	
	3.30 p.m.	do-----	1	43	
	5.35 p.m.	do-----	1	44	
	9.00 p.m.	do-----	1	44	
July 20, 1857----	6.00 a.m.	Sand-----	1	44	430
	7.10 a.m.	do-----	1	45	
	8.05 a.m.	do-----	1	43	
	9.00 a.m.	do-----	1	40	
	10.00 a.m.	Soft sand-----	1	44	
	10.30 a.m.	Coarse sand-----	1	47	
	11.10 a.m.	Soft sand-----	1	40	
	12.15 p.m.	Coarse sand-----	1	44	
	12.38 p.m.	Soft sand-----	1	41	
	1.40 p.m.	Coarse sand-----	1	42	
July 21, 1857----	12.00 m.	Coarse sand-----	1	40	241
	2.00 p.m.	Sand and mud-----	1	34	
	3.45 p.m.	do-----	1	38	
	6.07 p.m.	Fine sand-----	1	46	
	7.03 p.m.	do-----	1	45	
	7.50 p.m.	do-----	1	38	
July 22, 1857----	5.26 p.m.	Fine sand-----	1	46	179
	6.21 p.m.	do-----	1	45	
	6.48 p.m.	do-----	1	44	
	7.37 p.m.	do-----	1	44	
July 23, 1857----	6.30 a.m.	Fine sand-----	1	45	994.
	7.20 a.m.	do-----	1	43.5	
	8.03 a.m.	do-----	1	40	
	8.03 a.m.	Sand and clay-----	1	44	
	9.32 a.m.	do-----	1	44	
	10.00 a.m.	do-----	1	44	
	11.12 a.m.	do-----	1	44	
	11.12 a.m.	do-----	1	42	
	12.48 p.m.	do-----	1	43	
	12.48 p.m.	do-----	1	45	
	1.35 p.m.	do-----	1	41	
	1.35 p.m.	do-----	1	45	
	2.52 p.m.	do-----	1	44	
	2.52 p.m.	do-----	1	43	
	4.42 p.m.	do-----	1	42	
	4.42 p.m.	do-----	1	43	
	6.25 p.m.	do-----	1	41	
	7.10 p.m.	do-----	1	44	
	8.00 p.m.	do-----	1	42	
	8.00 p.m.	do-----	1	44	
	9.07 p.m.	do-----	1	35	
	6.25 p.m.	do-----	1	48	
	9.07 p.m.	do-----	1	48	

No. 3—Continued.

Date.	Hour.	Material.	Number of loads.	Number of yards.	
July 24, 1857-----	6.45 a.m.	Coarse sand-----	1	46	
	6.45 a.m.	-----do-----	1	42	
	8.27 a.m.	-----do-----	1	41	
	8.27 a.m.	Coarse and fine sand--	1	44	
	10.13 a.m.	-----do-----	1	44	
	10.13 a.m.	-----do-----	1	44	
	11.37 a.m.	-----do-----	1	44	
	11.37 a.m.	-----do-----	1	43	
	1.11 p.m.	-----do-----	1	46	
	1.11 p.m.	-----do-----	1	43.5	
	2.50 p.m.	-----do-----	1	43	
	2.50 p.m.	-----do-----	1	45	
	3.42 p.m.	-----do-----	1	45	
	4.40 p.m.	-----do-----	1	46	
	6.00 p.m.	-----do-----	1	42	
	6.48 p.m.	-----do-----	1	44	
	7.50 p.m.	-----do-----	1	44.5	
	9.07 p.m.	-----do-----	1	40	
July 25, 1857-----	5.30 a.m.	Coarse and fine sand--	1	45	787
	5.30 a.m.	-----do-----	1	40	
	7.10 a.m.	-----do-----	1	44	
	7.10 a.m.	-----do-----	1	44	
	8.32 a.m.	-----do-----	1	40	
	8.32 a.m.	-----do-----	1	44	
	9.45 a.m.	-----do-----	1	45	
	9.45 a.m.	-----do-----	1	45	
	10.34 a.m.	-----do-----	1	45	
	10.34 a.m.	-----do-----	1	38	
	11.12 a.m.	-----do-----	1	43.5	
	11.52 a.m.	-----do-----	1	36	
	12.55 p.m.	-----do-----	1	38	
	12.55 p.m.	-----do-----	1	41	
	1.40 p.m.	-----do-----	1	44	
	2.40 p.m.	-----do-----	1	40	
	2.40 p.m.	-----do-----	1	43	
	3.45 p.m.	-----do-----	1	44	
	3.45 p.m.	-----do-----	1	38	
	4.47 p.m.	-----do-----	1	40	
	5.40 p.m.	-----do-----	1	40	
	5.40 p.m.	-----do-----	1	45	
	7.08 p.m.	-----do-----	1	40	
	7.08 p.m.	-----do-----	1	38	
	8.25 p.m.	-----do-----	1	36	
	8.25 p.m.	-----do-----	1	43	
	9.40 p.m.	-----do-----	1	35	
	9.40 p.m.	-----do-----	1	44	
July 27, 1857-----	6.00 a.m.	Coarse sand-----	1	44	1,158.5
July 28, 1857-----	5.20 p.m.	Coarse sand-----	1	40	44
	7.05 p.m.	-----do-----	1	46	
	7.31 p.m.	-----do-----	1	44	
	8.40 p.m.	-----do-----	1	47	
	9.25 p.m.	-----do-----	1	45	
July 29, 1857-----	6.08 a.m.	Coarse and fine sand--	1	46	222

REPORT OF THE  
No. 3—Continued.

Date.	Hour.	Material.	Number of loads.	Number of yards.	
July 29, 1857----	7.42 a.m.	Coarse and fine sand	1	45	597
	9.00 a.m.	do	1	47	
	9.00 a.m.	do	1	42	
	10.30 a.m.	do	1	45	
	11.18 a.m.	do	1	44	
	12.18 p.m.	do	1	44	
	12.18 p.m.	do	1	44	
	1.06 p.m.	do	1	20	
	3.07 p.m.	do	1	45	
	4.10 p.m.	do	1	44	
	5.36 p.m.	do	1	46	
	6.42 p.m.	do	1	41	
	8.50 p.m.	do	1	44	
July 30, 1857----	6.46 a.m.	Coarse sand	1	42	
	8.25 a.m.	Soft sand	1	44	
	9.33 a.m.	Coarse and fine sand	1	45	
	11.48 a.m.	do	1	44	
	3.00 p.m.	do	1	46	
	3.00 p.m.	Fine sand	1	44	
	4.23 p.m.	do	1	44	
	4.23 p.m.	do	1	44	
	5.53 p.m.	do	1	50	
	5.53 p.m.	do	1	46	
	6.32 p.m.	do	1	45	
	6.56 p.m.	do	1	45	
	8.00 p.m.	do	1	44	
	8.45 p.m.	do	1	46	
	8.45 p.m.	do	1	38	
	Total for July-----				667
					14, 159
August 1, 1857----	4.20 a.m.	Coarse and fine sand	1	45.5	
	4.20 a.m.	do	1	43	
	5.39 a.m.	do	1	45	
	5.39 a.m.	do	1	45	
	7.20 a.m.	do	1	46	
	7.20 a.m.	do	1	45	
	8.30 a.m.	do	1	44.5	
	8.30 a.m.	do	1	44	
	9.40 a.m.	do	1	42	
	9.40 a.m.	do	1	44	
	10.30 a.m.	do	1	44	
	10.30 a.m.	do	1	44	
	11.30 a.m.	do	1	44	
	11.30 a.m.	do	1	44	
	1.20 p.m.	do	1	43	
	1.20 p.m.	do	1	43.5	
	2.30 p.m.	do	1	44	
	2.30 p.m.	do	1	43.5	
	3.00 p.m.	do	1	43	
	3.00 p.m.	do	1	44	
	3.45 p.m.	do	1	44	
	3.45 p.m.	do	1	44	
	4.50 p.m.	do	1	43	
	5.30 p.m.	do	1	35	

## No. 3—Continued.

Date.	Hour.	Material.	Number of loads.	Number of yards.]	
August 1, 1857 --	7. 30 p.m.	Coarse and fine sand	1	44	1, 367
	7. 30 p.m.	do	1	42	
	8. 25 p.m.	do	1	40	
	8. 25 p.m.	do	1	40	
	10. 00 p.m.	do	1	38	
	10. 00 p.m.	do	1	36	
	11. 00 p.m.	do	1	40	
	11. 00 p.m.	do	1	40	
August 3, 1857 ---	6. 30 a.m.	Coarse sand	1	45	
	6. 30 a.m.	do	1	44	
	8. 00 a.m.	do	1	46	
	8. 00 a.m.	do	1	45	
	9. 10 a.m.	do	1	46	
	9. 10 a.m.	do	1	44. 5	
	9. 50 a.m.	do	1	48	
	9. 50 a.m.	do	1	45	
	10. 30 a.m.	do	1	48	
	10. 30 a.m.	do	1	45. 5	
	11. 15 a.m.	do	1	46	
	11. 15 a.m.	do	1	44	
	12. 30 p.m.	do	1	47	
	12. 30 p.m.	do	1	38	
	1. 15 p.m.	do	1	46. 5	
	1. 45 p.m.	do	1	46	
	1. 45 p.m.	do	1	46	
	3. 05 p.m.	do	1	44	
	4. 37 p.m.	do	1	43	
	4. 37 p.m.	do	1	43. 5	
	5. 48 p.m.	do	1	44	
	5. 48 p.m.	do	1	44	
	7. 10 p.m.	do	1	45	
	7. 10 p.m.	do	1	43	
August 4, 1857 ---	6. 44 a.m.	Sand and mud	1	44	1, 077
	6. 44 a.m.	do	1	44	
	7. 35 a.m.	do	1	42	
	8. 32 a.m.	do	1	43	
	9. 40 a.m.	do	1	44	
	10. 45 a.m.	do	1	45	
	11. 50 a.m.	do	1	42	
	1. 45 p.m.	do	1	43	
	3. 00 p.m.	do	1	45	
	4. 25 p.m.	do	1	45	
	4. 25 p.m.	do	1	45. 5	
	5. 50 p.m.	do	1	42	
	5. 50 p.m.	do	1	44	
	6. 31 p.m.	do	1	42	
August 6, 1857 ---	5. 00 a.m.	Sand and mud	1	46	6, 095
	5. 00 a.m.	do	1	44	
	5. 35 a.m.	Coarse sand	1	44	
	5. 35 a.m.	do	1	45	
	6. 20 a.m.	do	1	44	
	6. 20 a.m.	do	1	44. 5	
	7. 00 a.m.	do	1	44	
	7. 00 a.m.	do	1	44	



## No. 3—Continued.

Date.	Hour.	Material.	Number of loads.	Number of yards.	
August 6, 1857	7. 45 a.m.	Coarse sand	1	44	
	7. 45 a.m.	do	1	44. 5	
	9. 15 a.m.	do	1	44	
	9. 15 a.m.	do	1	44	
	11. 10 a.m.	do	1	40	
	12. 45 p.m.	Sand and mud	1	43. 5	
	12. 45 p.m.	do	1	44	
	1. 30 p.m.	do	1	43. 5	
	1. 30 p.m.	do	1	43. 5	
	3. 10 p.m.	do	1	44. 5	
	3. 10 p.m.	do	1	44	
	4. 20 p.m.	do	1	45	
	4. 20 p.m.	do	1	45	
	6. 17 p.m.	do	1	43	
	8. 45 p.m.	do	1	45	
	8. 45 p.m.	do	1	44	
	9. 50 p.m.	do	1	38	
	9. 50 p.m.	do	1	40	
	11. 00 p.m.	do	1	42	
August 7, 1857	12. 30 a.m.	Sand and mud	1	40	1, 177
	11. 30 a.m.	do	1	42	
	12. 36 p.m.	do	1	44	
	1. 17 p.m.	do	1	44. 5	
	2. 04 p.m.	do	1	44	
	3. 15 p.m.	do	1	44	
	4. 57 p.m.	do	1	44	
	4. 57 p.m.	do	1	43	
	6. 05 p.m.	do	1	43. 5	
	6. 05 p.m.	do	1	44	
	7. 47 p.m.	do	1	44	
	8. 30 p.m.	do	1	44	
	9. 15 p.m.	do	1	44	
	10. 30 p.m.	do	1	45	
August 8, 1857	10. 30 p.m.	do	1	44	698
	11. 45 p.m.	do	1	44	
	1. 35 a.m.	Sand and mud	1	40	
	2. 02 a.m.	do	1	38	
	3. 45 a.m.	do	1	40	
	5. 40 a.m.	do	1	43	
	6. 35 a.m.	do	1	43	
	7. 20 a.m.	do	1	42	
	8. 00 a.m.	do	1	44	
	9. 15 a.m.	do	1	44	
August 10, 1857	9. 15 a.m.	do	1	43	561
	10. 42 a.m.	do	1	42	
	10. 42 a.m.	do	1	40	
	do	do	1	42	
	4. 30 a.m.	do	1	40	
	4. 30 a.m.	do	1	20	
	do	Sand and mud	1	43	
	do	do	1	44	
	do	do	1	43	
	do	do	1	44	

No. 3—Continued.

Date.	Hour.	Material.	Number of loads.	Number of yards.	
August 10, 1857..	-----	Sand and mud .....	1	44	
		Do .....	1	43	
		Do .....	1	44	
		Do .....	1	42	
		Do .....	1	44	
		Do .....	1	44	
		Do .....	1	44	
		Do .....	1	44	
		Do .....	1	40	
		Do .....	1	43	
		Do .....	1	42	
August 11, 1857..	1. 30 a.m.	Sand and mud .....	1	43	734
	5. 00 a.m.	-----do .....	1	40	
	5. 30 a.m.	-----do .....	1	15	
August 14, 1857..	7. 05 p.m.	Sand and mud .....	1	44	98
	8. 55 p.m.	-----do .....	1	43	
	8. 55 p.m.	-----do .....	1	44	
	9. 57 p.m.	-----do .....	1	42	
	10. 33 p.m.	-----do .....	1	42	
	11. 30 p.m.	-----do .....	1	44	
August 15, 1857..	12. 27 a.m.	Coarse and fine sand and mud .....			259
			1	40	
	1. 26 a.m.	-----do .....	1	42	
	1. 55 a.m.	-----do .....	1	44	
	4. 11 a.m.	-----do .....	1	44	
	5. 13 a.m.	-----do .....	1	38	
	7. 00 a.m.	-----do .....	1	45	
	8. 30 a.m.	-----do .....	1	43	
	10. 35 a.m.	-----do .....	1	42.5	
	1. 25 p.m.	-----do .....	1	41	
	3. 30 p.m.	-----do .....	1	44.5	
	5. 26 p.m.	-----do .....	1	44.5	
	6. 00 p.m.	-----do .....	1	42	
	7. 10 p.m.	-----do .....	1	44	
	7. 35 p.m.	-----do .....	1	44	
August 18, 1857..	6. 40 a.m.	Sand and mud .....	1	44	598.5
	6. 40 a.m.	-----do .....	1	43	
	8. 12 a.m.	-----do .....	1	44	
	8. 12 a.m.	-----do .....	1	43	
	9. 38 a.m.	-----do .....	1	44	
	10. 45 a.m.	-----do .....	1	45	
	11. 45 a.m.	-----do .....	1	44	
	12. 00 m.	-----do .....	1	42	
	12. 55 p.m.	-----do .....	1	44	
	2. 11 p.m.	-----do .....	1	44	
	2. 45 p.m.	-----do .....	1	44	
	3. 30 p.m.	-----do .....	1	44	
	5. 00 p.m.	-----do .....	1	44	
	5. 25 p.m.	-----do .....	1	44	
	6. 20 p.m.	-----do .....	1	45	
	6. 20 p.m.	-----do .....	1	43	
	7. 40 p.m.	-----do .....	1	44	
					745

## No. 3—Continued.

Date.	Hour.	Material.	Number of loads.	Number of yards.	
August 20, 1857--	1. 05 p.m.	Sand and mud -----	1	44	308
	2. 00 p.m.	-----do-----	1	44	
	3. 05 p.m.	-----do-----	1	44	
	4. 30 p.m.	-----do-----	1	44	
	7. 05 p.m.	-----do-----	1	44	
	9. 05 p.m.	-----do-----	1	44	
	10. 52 p.m.	-----do-----	1	44	
August 21, 1857--	12. 45 a.m.	Sand and mud -----	1	44	280
	3. 15 a.m.	-----do-----	1	43	
	5. 00 a.m.	-----do-----	1	45	
	8. 05 a.m.	-----do-----	1	44	
	9. 20 a.m.	Mud, sand, and grass	1	45	
	11. 55 a.m.	-----do-----	1	44	
	2. 25 p.m.	-----do-----	1	15	
, 1857--	2. 30 p.m.	Sand, mud, and grass.	1	45	131
	4. 30 p.m.	-----do-----	1	44	
	9. 30 p.m.	-----do-----	1	42	
August 25, 1857--	8. 05 a.m.	Sand and mud -----	1	43	366
	9. 25 a.m.	-----do-----	1	43	
	10. 30 a.m.	-----do-----	1	42	
	12. 35 p.m.	-----do-----	1	42	
	2. 50 p.m.	-----do-----	1	44	
	4. 18 p.m.	-----do-----	1	44	
	6. 20 p.m.	-----do-----	1	44	
	8. 12 p.m.	-----do-----	1	44	
	9. 30 p.m.	-----do-----	1	20	
August 26, 1857--	5. 40 p.m.	Sand and mud -----	1	44	87
	5. 40 p.m.	-----do-----	1	43	
30, 1857--	10. 00 a.m.	Sand, mud, and grass.	1	44	86
	11. 30 a.m.	-----do-----	1	42	
Total for August-----					9, 261

From the preceding journal of operations performed under the contract before mentioned, it is shown that notwithstanding the unfavorable weather that has occurred, causing frequent interruptions of the work, during the two months of July and August there have been excavated and deposited, about 500 yards distant from the channel, 23,420 cubic yards of earth. The material removed consists of fine or coarse sand, occasionally mingled with clay or mud. A cut from 40 to 45 feet in width, and about 14 feet in depth, has been excavated entirely through from the river channel to the deep water of the lake. It is proposed to expend the remainder of the appropriation in widening this cut.

The United States sub-agent at the flats informs me that since the channel has been opened a strong current passes through it. The velocity has not yet been measured, but it is probably twice as great

as that obtained at the same place during the survey last autumn. This fact I think promises well for the permanency of the cut proposed to be excavated.

It is considered highly important to the extensive commerce of the lakes that a navigable channel should be completed through the flats during the working season of 1858.

The following extract from a letter, received from Theodore D. Barton, esq., the contractor, shows that this desirable result may be accomplished :

“ In answer to your communication \* \* \* as to the amount of machinery I will employ on the St. Clair flats next season, I will say that I will put on the flats, early in May next, such a number of dredges and boats as you shall deem sufficient to use up the appropriation that now is, or may then be, made for said work.”

The remainder of the appropriation at present available for this improvement is \$36,391 94. This will pay for the excavation and removal of about 109,175  $\frac{3}{16}$  cubic yards, leaving 61,405 cubic yards of dredging to be provided for, in order to obtain a channel of the width and depth recommended by the board of engineers, and approved by the department.

Adding to the cost of this additional excavation (\$18,421) the amount of necessary expenses for superintendence and a small sum for contingencies, (say \$5,000,) \$23,421 is found to be needed for the consummation of the project. I would, therefore, respectfully recommend that the bureau adopt measures to bring this subject before Congress at its next session, in order to obtain an appropriation of \$23,421 for this purpose, in time to be available for operations during the following season.

## 2. *For construction of foundations for a light-house and a beacon-light on St. Clair flats.*

The plans for these structures having not yet been sufficiently digested or approved, no expenditures have been made by me under this appropriation.

A requisition has been made for a boring machine to ascertain the kind of strata upon which, at the points selected, the foundations would rest. It is now proposed to make the necessary examinations during the present autumn, and submit plans and estimates to the bureau for approval, so that the erections may be commenced and completed the succeeding summer.

## 3. *For deepening the channel of the St. Mary's river.*

The act making an appropriation for this object is in the following words, viz :

“ *Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That the sum of one hundred thousand dollars be, and the same is hereby, appropriated towards deepening the channel of the St. Mary's river, in the State of Michigan, by the west channel through Lake George, according to the estimate of Captain Macomb, of the topographical engineers, communicated to the Senate in the report of the Secretary of War, dated January eighteen, eighteen hundred and fifty-five: *Provided*, That

the dredging machine purchased for the improvement of the St. Clair flats may be employed, when not required therefor, at the discretion of the Secretary of War, in the improvement of the St. Mary's river or strait."

I was detailed for the charge of this work at the same time as for that of St. Clair flats.

After an investigation of the maps and reports of the officers of the lake survey, who had made examinations in the St. Mary's river, I became convinced that the east channel through the flats of Lake George was far preferable for improvement to the extreme western one, and reported my opinion on this subject to the bureau. The recommendation in relation to this point was disapproved, and I was directed on the 5th of March to have dredging of the west channel executed by contract, on due notice.

In conformity with this order, the following agreement was made for the performance of the work, viz:

"These articles of agreement, made the fourth day of April, A. D. one thousand eight hundred and fifty-seven, by and between Theodore D. Barton, of the city of Buffalo, and State of New York, and S. C. Osgood, of the city of Troy, and State of New York, of the first part, and Captain A. W. Whipple, of the United States corps of topographical engineers, in behalf of the government of the United States, of the second part, witnesseth:

"That the party of the first part, for and in consideration of the conditions hereinafter mentioned, hereby covenant and agree with the party of the second part to perform such dredging as may be required for the deepening of the channel of the St. Mary's river, in the State of Michigan, by the west channel through Lake George, and to deposit the material to be removed at such points as the agents of the United States may direct.

"It is further understood and agreed by the parties to this contract, that the party of the first part will put in operation upon the work two dredging machines, and a sufficient number of dumping scows, together with one steam tug; all capable of dredging and removing one thousand yards per day, as early in the spring of 1857, as is practicable, after this contract is officially approved; and will vigorously prosecute the work until completed, or the appropriation for it is exhausted.

"In consideration whereof, the party of the second part, for and in behalf of the United States, in the matter aforesaid, hereby agrees, in case the work above mentioned shall be executed in conformity to the conditions of this contract, and be accepted as satisfactory to the authorized agent of the United States to make monthly payments to the party of the first part of ninety per cent. upon the amount of work accomplished, at the following prices, namely:

"*First.* For all earth, such as sand, gravel, stone or clay, not cemented, the sum of 37 cents per cubic yard.

"The material to be measured on the scows at or near the place of deposit.

"*Second.* For hard-pan, or cemented clay, \$1 50 per cubic yard.

"*Third.* For rock, whether in boulders or in place, measuring above one half a cubic yard, at the rate of ten dollars per cubic yard; the

party of the second part, or other authorized agent of the United States, being the judge as to the classification of the different materials above mentioned.

"The reserved 10 per cent. will be paid to the party of the first part when the whole operation has been completed to the perfect satisfaction of the United States or its authorized agent.

"During the operations an agent of the United States, or a sub-agent under the orders and control of the officer in charge, will be present to direct where the work shall be performed, to determine the slopes required for the formation of the sides of the channel, designate the points where the material shall be deposited, and to measure and keep an account of amount excavated.

"In case it shall be deemed necessary to cause the material excavated to be removed *more than half a mile* from the place of dredging, the officer in charge shall estimate the reasonable cost of such extra removal, and add it to the sum already agreed upon to be paid. And, should any differences of opinion arise between the party of the first part and the sub-agent of the United States with regard to this agreement, they shall be referred to the officer in charge, whose decision shall be final.

"It is, moreover, understood and declared by the parties to this contract that no member of Congress or officer of the army or navy of the United States has any interest or concern, directly or indirectly in said agreement.

"That said agreement, or any part of it, or any act growing out of it, cannot be transferred, but shall be executed by the party of the first part, or some person answerable to such party, who are alone responsible for its fulfilment.

"It is also understood and agreed by the parties to this contract that it is not binding upon the United States, or will go into operation, until it has been sanctioned by the Secretary of War or the chief of the topographical engineers, at Washington.

"In witness whereof, the parties to this agreement hereunto set their hands and seals, in presence of the subscribing witnesses, on the day and year before written.

[Done in quadruplicate.]	"THOS. D. BARTON,	[SEAL.]
	"J. C. OSGOOD,	[SEAL.]
	"A. W. WHIPPLE,	[SEAL.]
	"Capt. Topog'l Eng'rs.	

"In presence of—  
 "CHAS. P. DWYER.  
 "J. MAYHEW.

"APRIL 8, 1857.

"Examined, and respectfully recommended to be approved.

"J. C. WOODRUFF,  
 "Captain Topographical Engineers,  
 "Assistant to Col. of Topog'l Eng'rs.

"J. J. ABERT,  
 "Colonel Corps Topographical Engineers.

"WAR DEPARTMENT, April 24, 1857.

"Approved.

"J. B. FLOYD, Secretary of War."

The contractors had an entirely new outfit of machinery constructed for this operation, viz: one steam tug, two steam dredging machines, and four dumping scows, besides a yawl and a wood boat; but they were unable to reach Lake George until about the 14th of July, upon which date the dredging was commenced.

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OFFICE ST. MARY'S RIVER IMPROVEMENT,  
*Detroit, Michigan, July 23, 1857.*

SIR: I arrived at St. Mary's river on the 5th instant. Having employed a boat's crew of Indians, on the following day I encamped on a small tract of land called Gem island, and commenced to sound and mark with beacons and buoys the most western channel over the flats of Lake George. This operation proved very tedious, in consequence of the length and circuitousness of channel.

The position of the upper cut was first marked. At the northern end of it the dredges which arrived on the 13th instant were immediately placed, so that the excavation was commenced on the following morning. The operation of marking and sounding the channel in its whole length was completed on Friday, 17th ultimo; when having been informed that an Indian half-breed knew of another channel more direct than that upon which the dredging had been commenced, I found him and secured his services as a guide through it. The passage appeared to me so favorable for improvement, that on the next day, Saturday, I placed buoys and made sufficient soundings to obtain an approximate survey. A plot of this work is herewith submitted. From the rapidity with which I was compelled to perform the operation, as I could spare no more time from other important duties that claimed attention, the survey is necessarily rough, but I believe it is mainly correct.

A few soundings in this channel are found upon the lake survey chart; but the curves to indicate deep water are omitted. As it is west of the centre line of the lake, and has a more direct course, as well as deeper water than the other, I have termed it the "main west channel." For its improvement one cut only would be required across the flats, the distance between the 12 feet curves at the ends being about 3,550 feet. Excavation to 12 feet in depth, 300 feet wide, would amount to 131,945 cubic yards, at 37 cents per cubic yard—\$48,819; or, adding 10 per cent. for contingencies, \$53,702.

The water this season is said to be unusually high, being, by comparison with soundings in 1853, about half a foot above its level at that time.

Captain Scammon reported that, in 1854, the depth of water was less than during the survey the preceding season, by 13". From the best information I can obtain, the surface of Lake George is now 15" higher than last year. Hence, upon the 12 feet curve of Captain Scammon's survey the depth of water in different years should have been as follows: In 1853, 12 feet; in 1854, 10 feet 11"; in 1856, 11 feet 3"; in 1857, 12 feet 6".



Neither of the foregoing years mentioned appears to have been noted for a remarkably low stage of water. The extremes of variation are said to occur usually at an interval of seven years. In consequence of information derived upon this subject, it has seemed to me proper to direct the excavation of the channels, which are being cut on the St. Clair and in the St. Mary's river, to be made to the depth of 14 feet, that vessels may be enabled to pass through during the seasons of low water.

It is evident that the fact above stated will add greatly to the amount of material required to be excavated in the extreme west channel, through the flats of Lake George.

In this main west channel, for a much larger portion of the distance, is found water to the depth of 14 or 15 feet; and to give the increased depth, will require less additional cutting in the latter than in the former channel. The estimate for excavating across the flats to the depth of 14 feet, in the improvement of the main west channel, is as follows, viz :

Length.	Depth.	Depth of cuttings.	Remarks.
1,750 feet.....	8 feet.....	6 feet.....	When the depth of water is not less than twelve feet, the surface of the ground is covered by soft clay or mud to such a depth as probably to render excavation unnecessary.
1,000.....	9½.....	4½.....	
500.....	9.....	5.....	
650.....	11.....	3.....	
450.....	11.5.....	2½.....	

The whole amounts to 228,611 cubic yards, which, to excavate, at 37 cents per cubic yard, would cost.....	\$84,586 07
Add 10 per cent. for contingencies.....	8,458 69
Total cost of improvement.....	<u>93,044 76</u>

This channel I would most respectfully recommend for improvement, instead of the extreme west channel, upon which operations have been commenced. The former is west of the centre line of the lake, and appears to be the larger channel of the two. It may, therefore, with propriety, be considered "the west channel through Lake George," in conformity with the terms of the law making the appropriation. Should the the bureau approve of this recommendation, I would respectfully request information by telegraph, that the dredging machinery may quickly be transferred to a new position.

I have the honor to be, very respectfully, your obedient servant,

A. W. WHIPPLE,

*Captain Topographical Engineers.*

Col. J. J. ABERT,

*Com'g Corps Topographical Engineers, Washington, D. C.*

BUREAU OF TOPOGRAPHICAL ENGINEERS,  
Washington, July 29, 1857.

SIR: The bureau does not concur in the views presented in your letter of the 23d instant.

The evident tendency of the currents of Lake George is by two channels, east and west, so called, as is manifest by the greater uniformity in the depth of water through these channels.

The main west channel, the channel recommended by you for improvement, is covered, if the expression be allowed, by a bar, or deposit of sand, extending from the east to the extreme west channel, and with a width of three-fourths of a mile.

Were this cut through the bar made, there is reason to apprehend that it would, by the operation of natural causes, be soon closed by another deposition.

It is deemed the safer course to follow the indications of the currents than to force the currents.

Respectfully, your obedient servant,

J. J. ABERT,

*Colonel Corps Topographical Engineers.*

Captain A. W. WHIPPLE,

*Corps Top. Eng., Detroit, Michigan.*

The following extracts of the journals kept during the work will convey an idea of the operations performed and the difficulties encountered:

*Journal of operations connected with the dredging in St. Mary's river, under direction of Captain A. W. Whipple, Topographical Engineers; by M. C. Dunnier, sub-agent.*

July 4, 1857.—Started from Detroit on board the North Star at 11.30 a. m.; our company consisted of Captain Whipple, Mr. Forster and M. C. Dunnier, three men and a colored cook. The day was very pleasant.

July 6.—After breakfast we prepared our boats and started for the flats of Lake George, distant about seven miles; Captain Whipple went with the son of Mr. Church in search of a new channel they had spoken of, and the remainder of the party soon found themselves on a small island of about one and a half acre in area, and named it Gem island; went to work and made a shed, which was rather comfortable, taking into account the material used for cover, which was the branches of spruce trees; Church and men went home, not being able to find new channel; day pleasant; wind blew fresh, about 4 p. m., from NW., until about 8 p. m.

July 7.—Young Church and some Indians arrived this morning to assist in operating. Went to work to lay out the channel next the island. Church and three of his men went home in afternoon. Day cloudy and looked like rain. Blew up fresh and pleasant towards evening, and turned colder before morning. Some Indians arrived during the night, sent by Mr. Church to assist during to-morrow.

July 8.—Started out to work before breakfast. Sounded part of the

channel. Sunk buoys, and took breakfast about 9 a. m. Pleasant day; light wind and warm sun. Closed work to-day at 6.15 p. m. Carpenter preparing a water-gauge, to be placed permanently at this island. Gauge completed and fixed. Surface of water 4.49; depth of water 3.55; gauge being driven 0.94 below gradation.

*July 9.*—Set out range beacons for deposit of material, from south point of Gem island. Course, north 37 east. Next set beacons for width of channel on head of channel. Finished laying out north end of channel; then proceeded down to first bend. Set buoys and beacons on channel line of 12 feet curve. Set buoys and beacons for width of 300 feet channel. Sounded on several lines. Day very pleasant; clouds light, and wind southeast, very light. Water on gauge at 8 p. m., 4.47 feet.

*July 10.*—Sent Indians before breakfast for some bark to secure our house. After breakfast took up some beacons and changed them; took soundings, &c. After dinner took soundings on part of lines that were laid out. Also made a triangulation of the same between beacons. Sounded from beacon C to Gem island; found not less than 8 feet of water to within 50 feet of island. Day pleasant; very warm from 11 a. m. to 3 p. m.

*July 11.*—Took angles on first curve on channel at beacons 7, 8, 9, and 10; also connected with first cut at head of channel, and with triangular points of lake survey, B. and M., and with south side of Gem island. Thence sounded in range of above beacons, and diagonally for approximate calculations of quantities. Captain W. went to Church's. Men went into woods, at 3 p. m., for materials to make buoys; brought a good lot. Day very pleasant; warm and calm. Put down a new water-gauge, denoting the proper depth of water; read, at 6 p. m. to-day, 3.48 feet.

*July 12 (Sunday).*—About 2 p. m. light breeze started up from SE. Day very pleasant. Captain W. returned accompanied by Captain Allen.

*July 13.*—Set intermediate buoys on upper cut; took angles to determine them. Went down to middle cut; arranged intermediate buoys; took angles to fixed points of lake survey; thence set out buoys on 12 feet curve on lower part of channel, and found it to correspond nearly with soundings of lake survey. Set 20 buoys on this channel. Very satisfactory day's work. Dredge and tug arrived and anchored at foot of channel, on flats, about 3.30 p. m. Smart SE. breeze. Water rolled considerably. Indications of a storm to S.

*July 14.*—Went on board the dredge boats and measured the capacity of the deposit boats; raised beacons 1, 2, 3, 4, 5, which were thrown down by the storm last night; thence went to stake out channel on 3d cut; finished staking out to Neebish; named small island near cut 3 Rock island; dredges went to work, took out 150 yards up to 7 p. m.; day cloudy and likely to rain; smart northwest breeze from 2 p. m. to 6.30 p. m.

*July 15.*—Went on board the dredge boats; thence went and adjusted cuts Nos. 2 and 3; had one of the handles of dipper of dredge boat broken, and work interrupted very frequently by smaller accidents, as the boats and machinery are new and untried; Mr. Forster

and remainder of party from Detroit left this morning, (except Captain Whipple,) in company with Osgood and Barton; morning foggy; cleared up at 12 m.; afternoon very fine, calm, and clear.

*July 16.*—Took soundings from beacon 10 to buoy 38, and marked all the buoys from 10 to 38; thence back, on southwest side, to beacon 9; took angles from several buoys to east, south, &c., on Sugar island; also courses of proposed new channel; Captain Whipple to Mr. Church's this morning, we being almost out of provisions; returned this morning at 6.30 a. m. with sufficient; got another dipper handle broken to-day; men at work making a new one; expect to be ready by to-morrow noon; day very pleasant and warm; very light wind from southeast in afternoon at 5.30 p. m.; Messrs. Osgood and Barton, with Mr. Forster, left Church's this morning on board the Illinois for Detroit.

*July 17.*—Captain Whipple and his party succeeded in finishing laying out channel to-day; only one dredge at work; other undergoing repair; one is working pretty well, but find much difficulty in gauging proper depth, as the machinery is new as well as the crew; weather fine; very light wind from southeast, and appears as though we may have good weather.

*July 18.*—Went to sound and examine what is called a false channel; found an outlet of deep water to northeast of present new channel; thence through nearly middle of lake about 1 mile of cutting; thence partly deep water to Pumpkin point, but rather narrow; had not time to put buoys on west side; took courses of all we had done; also some angles to prominent stations on shore; found another outlet to above mentioned cutting about N. 75 E. to outlet; sold cooking stove, &c., at auction; discharged laborers; Captain Whipple left and went to Church's to meet the North Star for Detroit; day fine, warm, with light wind towards night; thunder and rain at night; dredge is yet undergoing repairs; one only at work.

*July 19.*—This morning appears clear and a little cold; spuds of dredge are repairing; went up on board the tug-boat to Mr. Church's to see Captain Whipple; did not see him, he being absent; waited about one hour; returned with boat to dredge; smart northwest wind; day cool.

*July 20.*—Only one dredge at work to-day; spuds of other undergoing repairs; finished repairing them this evening. Dredge No. 2, which has been at work, has not worked satisfactorily, as the addition put on bottom of old spuds was too blunt, and front ones were taken out to-day and sharpened. We are also somewhat interrupted by the wind. Much time taken up in trying to make her keep her place. Day unpleasant, with light rain and smart wind from SW.; very cold and cloudy; stopped work at 8 p. m. Material to-day, more sand than usual. All the beacons were thrown down by the wind. Found proper depth of water after dredging of Saturday last, and to-day equal to 13½ and 14 feet.

*July 21.*—Both dredges commenced work this morning, at 4 a. m. Dredge No. 2 broke pinion wheel and stopped work; commenced again at 12 m. No. 1 broke pinion wheel and stopped work at 2 p. m. No. 1 broke down again at 5 p. m. Dipper broke loose from handle, and both

are undergoing repairs. No. 1 struck very hard material this morning, somewhat similar to hard pan. It is very hard green sand. Dipper raised 135 times to fill 25 cubic yards in scow. Received a note at 12 m., by Mr. Church, from Captain Whipple, with directions, &c. Wind continues from NW.; light breeze; forenoon cloudy, and clear in the afternoon, with moderate wind. Started to plot some of the notes in connexion with channel to be dredged this afternoon. Wrote copies of letters of instruction received from Captain Whipple, and forwarded him copies according to directions; also wrote him concerning the hard material, requesting directions as to classification, &c.

*July 22.*—Both dredges went to work this morning. Dredge No. 1 has been to work without interruption from 5 p. m. yesterday to 3 p. m. to-day, and only took out 38 yards of hard sand. The material is so hard that large dippers have no effect; sounded and tried material from dredge to beacon 6; found hard bottom to a point 1,800 feet ahead of beacon 2. Removed both dredges at 2.30 to this point, where they appear to work so far successfully. Broke backing chain of dipper. Stopped one hour to repair; smaller and different shaped dippers must be had, in order to be able to excavate the hard sand we have left between beacons 2 and 4. No. 2 dredge had two breaks to-day; delay about 1½ hour. Saved several pieces of the hard material, intending to send to Captain Whipple. Stopped work to-night at 8 p. m. Day pleasant, with fresh breeze from NNW. up to 8 p. m., then changed to SSW.; a lighter breeze raised all the beacons to-day, as they were all thrown by the wind. Had two men off the dredge 2 hours each; collected specimens of hard material.

*July 23.*—Both dredges went to work this morning at 4 a. m. Worked very successfully to-day. Dredge No. 2 delayed about 1½ hour. Material very good, principally fine clay. Found difficulty in keeping No. 1 (forward dredge) in line, and also to keep proper depth. Sent off specimens of materials to Captain Whipple, also a letter relative to the progress of the work. Day pleasant in forenoon, with light breeze from NW. At 3.30 p. m. had a light shower of rain and hail, which appeared much heavier on shore at each side of us. Wind changed during rain to SE., then, after shower, changed back to NW. Day closed with dense fog. Appearance of heavy rain to N. and NW. Stopped work at 8.15. Tug at work until 9.15 p. m.

*July 24.*—Both dredges went to work this morning at 4 a. m.; dredge No. 2 lost three-quarters of an hour in forenoon; both lost three-quarters of an hour in afternoon waiting for tug while up to Church's; material very good, (being fine clay;) very little wind from NE.; day pleasant and clear; stopped work at 8 p. m.

*July 25.*—Both dredges went to work this morning about 6 a. m.; dredge No. 1 was delayed five hours; turn table out of order; No. 2 lost one hour by breaking backing chain, and did not work successfully while in order, as there appeared to be confusion or bad discipline among the men. Dredge No. 1 met with a small bar of hard sand, which appeared to extend only a few feet in length; did not consider it worth taking notice of the quantity of hard material. Stopped work at 8 p. m.; tried depth of water after dredges; found it

pretty regular thirteen and a half and fourteen feet—fourteen and a half in a few places. Illinois passed down 11 a. m., and North Star up about 4 p. m. Day pleasant, with light breeze NW.

*July 26.*—Smart SW. wind blows this morning, making a heavy sea; went to Gem island about 10 a. m.; found water gauge 3.55 feet, about as usual; wind changed to NW. about 4 p. m., and continued with rain to 12 m.

*July 27.*—Day began with smart wind from SW.; cold rain; rain stopped 6 p. m.; wind changed to W.; began work with dredges at 4 a. m.; No. 1 lost one hour by breaks, and one hour stopped from effects of high winds; No. 2 lost one and a half hour by breaks, and one hour by wind; commenced working extra gang this morning; much confusion appears among the men; they do not like the new arrangements; talk of quitting, &c.; stopped work at 8 p. m.; dredge No. 2 encountered some hard material to-day, but, as it did not extend far, I took no note of the amount. Probable quantity taken out, three to five cubic yards.

*July 28.*—Dredges went to work this morning at 4 a. m. No. 1 broke rack of dipper at 6 a. m., lost two hours. Upright shaft, one hour; turn table chain, three-quarters of an hour; speed too deep, one-half hour; after striking hard material, one hour—five hours and a quarter, in all, delay for No. 1. No. 2 delayed one hour repairing steam head. No. 1 struck hard material about 3 p. m., and worked three and a quarter hours, taking out ten cubic yards; was compelled to stop; could do nothing. Sounded and bored ahead; found material softer 250 feet ahead. Point at which hard material commences is 350 feet back of beacon 6, or thirty feet back of next intermediate buoy, back of 6. At this point bored through hard material; found it 3.6 thick. Depth of water at this point, before dredging, 11.3. Raised all the beacons. Day cold and cloudy, with light rain in forenoon. Cleared up cold, with smart SW. wind in p. m. Stopped work to-day 7.30 p. m. with much dissatisfaction. Feel the want of help to sound, row, and assist to examine the parts dressed, as well as to make further examination of material, &c.; cannot have men from dredges.

*July 29.*—Dredge 1 removed back to beacon 2, head of first cut, at 8 a. m. in consequence of hard material. No. 2 also began at same point at 12 m., but worked before she was removed, until she struck hard material. Dredge No. 2 lost two hours by breaking machinery. No. 1 was 3.40 loading one scow, of which is estimated eighteen yards hard material. Sounded after dredging; found line very irregular on edge; put eleven buoys on edge of new channel to guide dredges; also put in some in places not dredged to full depth; found thirteen and a half feet of water; in a few places fourteen and fourteen and a half; had two men from dredge from 8 a. m. to 5 p. m. to row while sounding and fixing channel. Day calm up to 5 p. m., then light wind from SW., with light rain; clouds heavy, denoting rain; water gauge on Gem island, before noon, 3.63, being higher by nearly one inch than usual since time of record. Cannot say there is any improvement in organization of dredging.

*July 30.*—Tug-boat St. Mary took fire last night under the grate;



burned out part of keelson and lining before the fire was extinguished; was undergoing repair to 2 p. m. to-day, which delayed dredges from 8.30 a. m. to 3.30 p. m.; dredge No. 1 broke friction lever at 7.30 p. m., which was about stopping time; made cross sections in record book of cut No. 1; cuttings taken from soundings; cross sections made with a view to estimating total quantities after being measured in scows; rained heavily during night, and continued for all forenoon, also at intervals in afternoon; wind from SW.; towards night light gale with very heavy clouds and lightning. North Star passed down at 11 a. m., and Illinois up 1 p. m. Mr. Schyler placed a foreman in charge of dredge 1 at 1 p. m. to-day. Hope to see some improvement in organization; it is much needed; material to-day, a mixture of sand and clay, with a few hard spots.

*July 31.*—Both dredges began work this morning at 4. Worked to 3.30 p. m., without any serious breaking or delays. Material very hard to-day in portions of bottom, but not in such large masses as usual. Have made no note of any hard material. Wind light in forenoon from W., cold and cloudy. At 4 p. m. was compelled to stop work from effects of high wind from W.; wind moderated by evening with fog, and very cold.

*August 11.*—Took two men from dredge this morning at 6; length of main line cut No. 1 from beacon 2 nearly to end. Compelled to stop by wind at 11.30 a. m. Measured and sounded parts dredged. Prepared sketch of channel, showing progress, &c. Whole length of cut No. 1 about 2,611 feet. Wind high from NW. Dredges stopped by wind at 1 p. m. Material very hard. Wind more moderate towards night; clear sky, and day rather cold. Both dredges stopped to repair this p. m.: No. 1 to repair dipper handle; No. 2 to repair friction wheel. Removed dredges at 5.30 p. m. to a point ahead of beacon 4, as the material is too hard at last point near beacon 2. Removed No. 2 also at 6.50 to near same point, but did no more work, as the wind was too high from NW.

*August 2.*—Tug St. Mary left dredges at 6.30 this morning for Sault Ste. Marie. Called at Mr. Church's; received letter from Captain W., with directions, &c.; took Mr. Church and son on board and some of his men. Arrived at the Sault at 11.30 a. m.; left Sault at 3.30 p. m.; got home at 6 p. m.; day very pleasant and warm, with light breeze from SW.

*August 3.*—Both dredges commenced work this morning at 4, and both broke down in a few minutes after. Lost about  $1\frac{1}{2}$  hour each. Dredge No. 1 broke again two different times during day; lost 1 hour. Also, No. 2 broke down again twice. Lost in all about two hours. Material very good to-day, it being very fine clay, overlaid with about six inches of sand and mud. Mr. Church sent me two men to assist to do some work on channel. Cross sectional cut No. 1; bored and examined the extent of hard material. Also, finished measurement of main line of cut 1. Found soundings across at each cross-section. To assist calculation of material, raise all the beacons down to 10. Bored through and cut No. 2 in a few places; found hard material there, as in cut 1, but sand appears somewhat coarser and more alive. Took reading of water gauge at Gem island, 3.65. It appears to have



raised about 0.15 inch within a month. Day pleasant; shower of rain about 1 p. m., also at 5.30 p. m., with heavy clouds and light SW. wind. A very satisfactory day's work to-day. Mr. Schyler sick.

*August 4.*—Dredges began at 4 a. m. and worked till 7.30 a. m. Had to await arrival of tug from Church's with wood. Delay  $\frac{3}{4}$  hour each, during which time dredge 1 was repairing backing chain. At 3.15 p. m. dredge 1 broke pinion of hoisting gear, which took the remainder of day to replace. Material to-day principally soft fine clay; very good excavation. I find much difficulty in getting dredges kept in line; have spoken to superintendent several times as to it, and yet it is not done. I attribute the being out of line, in most cases, to carelessness, unless when caused by wind. Found a place not dredged after No. 1, which I consider is left knowingly, as it was caused by removing dredge too far ahead. Day pleasant and warm, light breeze from N. in forenoon, and from NNE. in evening; sky clear. Made cross section, showing hard material, &c.; preserved several specimens of clay, &c. Stopped work at 7.35 p. m. No improvement in organization of men. Water gauge at Gem island, 3.65.

*August 5.*—Dredge 1 began at 4 a. m.; No. 2 had not her steam up by that time; blew off water out of boiler to hurry up steam; got to work at 5 a. m. At 7.30 a. m. pump of No. 2 out of order; only one gauge of water in boiler; considered it dangerous on board; repaired pump. Lost half an hour by breaking backing chain at 6 a. m., also quarter of an hour fixing hoisting lever at 8.45. No. 1 struck bar of hard sand at 8 a. m. 475 feet back of beacon 6. Forenoon very pleasant and warm, with light fog, and light breeze from N.; changed in afternoon to SW.; very fine day. Both dredges stopped work at 5.45 p. m., waiting on tug, which was at Church's for wood; little done after return of tug. Material good with dredge No. 2, and pretty good with No. 1. In afternoon went to Gem island; water 3.55, showing a fall within two days of nearly 0.1 foot. Day's work more satisfactory; line kept better. Moon rises with appearance of warm weather and clear sky. Saved specimens of material.

*August 6.*—Both dredges went to work this morning at 3.30 a. m. Dredge 2 broke backing chain at 6.30 a. m.; lost one hour. Dredge 2 broke friction lever of dipper at 1.30 p. m.; lost one hour. Dredge 2 broke backing chain at 2.15 p. m.; lost 35 minutes. Dredge 2 broke backing chain at 5.10 p. m.; lost 50 minutes. Dredge No. 2 struck hard bar of sand at 3 p. m.; got through it at 6.15 p. m. No. 2 turned back to take out bar left by No. 1. Broke backing chain at 5.15 p. m.; lost half an hour. Stopped to wait for tug at 6.20 p. m.; worked no more for the day. Whole time lost by No. 1, one hour and a half, and by No. 2, two hours and fifty-five minutes. Material generally good soft sand and clay, and, during the time worked, consider they did well. Men seemed more attentive in keeping line. Light wind from SE., and rather cold. Made a log for the purpose of measuring currents. Went to Gem island; water on gauge, 3.57.

*August 7.*—Both dredges went to work at 3.30 a. m. No. 1 lost, by breaks, to-day, one hour and thirty-five minutes; No. 2 lost, by breaks, forty minutes. No. 1 struck hard bar of sand at 11.30 a. m., at 375 feet back of beacon 6.; worked from 11.30 a. m. to 6.15 p. m.,

excavating 50 cubic yards. At 8 a. m., went to measure velocity of current; found it between beacon 2 and beacon 6, to be at the rate of 1,245.30 per hour; no wind sufficient to interrupt the accuracy of measurement. At 12 m. light breeze from SE., and cloudy; at 3 p. m., rained heavily, and continued up to 6 p. m.; wind changed to WSW.; very cloudy. Material very good with dredge No. 2, principally clay, mixed with a little sand. No. 1 worked in hard material. It seems altogether useless to keep her at work at the present point; current appears to bear in direction of Gem island. Dredge No. 2 carried high steam to-day, it being sometimes eighty pounds to the square inch, and only one gauge of water showing in boiler. Foggy and hazy to 9.30 p. m. Wind from WSW.

*August 8.*—Both dredges began work this morning at 3.30 a. m. Dredge No. 1 broke pinion wheel of dipper at 4.45 a. m.; lost  $2\frac{1}{2}$  hours. No. 1 removed at  $8\frac{1}{4}$  a. m. to 200 feet ahead of beacon 4; lost half an hour in removing. At 11 a. m. No. 1 broke dipper chain; lost 4 hours. The work of No. 1 to-day was not very satisfactory, as it had to encounter hard material. Wind made it difficult to keep line. No. 1 removed too far ahead of beacon 2. No. 2 was delayed 2 hours by breaking dipper friction lever twice; lost 20 minutes by tongue of dipper being out of order at 3.45 p. m. No. 2 struck hard material at 3.50 p. m., and worked up to 6.15 p. m.; thence removed back on second line, after No. 1, to about 75 feet ahead of beacon 4. No. 1 dug the most part of one scow load outside of main line, for which I allowed nothing. At 9 a. m. light breeze from west, clear sky, and cool. At 12 m. wind increased, and kept up pretty strong gale from west till 7 p. m. Water gauge on Gem island, 3.60.

*August 9.*—Tug went to Church's this afternoon. Day pleasant. Wind light, and from southeast. North Star passed down at 1 p. m.; took small boat to meet her, but was late. New foreman and four men arrived. Mr. Schyler resigned foremanship. Went to Gem island. Water gauge, 3.60.

*August 10.*—Both dredges went to work this morning, 3.30. Placed them near beacon 4, under direction of new foreman. Had Schyler and two men from 6 a. m. to 10 a. m. Put buoys on outside of new cut; also fixed old buoys on main line. Cut tops of beacons, as they would not stand up. They were so high the wind affected them. At 10 a. m. scow No. 2, or dredge No. 2, dumped 25 cubic yards by the breaking of day; lost half an hour. Tug left for Church's at 4 p. m. Dredge No. 2 lost 2 hours, until her return. Dredge No. 2 broke backing chain at 6.30; lost half an hour, and stopped for the day. No. 1 removed to her second width at 6 p. m., near beacon 4; lost 10 minutes by removing. Material good to-day, sand and clay. Water gauge on Gem island, 3.63. New superintendent left in small boat at 6 p. m. Wind light from southeast.

*August 11.*—Both dredges went to work at 3.30 a. m. No superintendent. Went to Church's last night; was informed he was not to return. Gave directions to men occasionally, and work went on as usual. Dredge No. 2 broke friction lever of dipper at 11 a. m.; lost half an hour. No. 1 broke backing chain at 1.50 p. m.; lost one hour. No. 2 got rack of dipper out of order at 2 p. m.; lost three-

quarters of an hour. No. 2 broke friction band of dipper at 4.30 p. m.; lost one hour. Material to-day principally sand and clay, with an occasional stratum of hard sand, but not sufficient to cause much delay in excavating. At 7.30 smart breeze from southeast, with heavy moving clouds. Water gauge on Gem island, 3.63.

*August 12.*—Both dredges began work at 3.30 a. m. At 6 a. m. wind blew smart breeze from southwest. Morning cloudy and cold. At 7.30 removed dredge No. 1 to beacon 2. On third width of cutting found difficulty in tracing edge of former cut, it being so irregular; lost 2 hours in removing and tracing line. At 12 m. dredge No. 2 lost one hour by breaking friction wheel. At 1.30 p. m. removed dredge No. 2 to a point 200 feet ahead of beacon 2 to take out large bar; left an old cutting. By so doing new channel will be nearly straight. At 11.30 dredge No. 1 lost one hour by breaking segment on dipper handle. Had two men from dredges from 8 a. m. to 12 m. finding channel, &c.; also from 2 to 4 p. m.—making 6 hours each worked. Material rather hard. No. 1 finds much difficulty in excavating, it being sand and a little clay; considerable portion of it hard sand. Day's work not altogether satisfactory. Water gauge on Gem island at 2.30 p. m. 3.76, it being 0.2 higher than usual; think this is caused by wind on Lake Huron blowing against current, and stopping water. At 7 p. m. wind southeast, very light. Clouds heavy, and denote storm.

*August 13.*—Both dredges began at 3.30 a. m. No. 1 lost one hour by breaking backing chain at 6.30 a. m. No. 2 broke friction band at 6.45; lost three hours. No. 1 lost three-quarters of an hour repairing friction band at 9.20 a. m.; No. 1 lost quarter of an hour by gearing of dipper handle being out of order at 10.30 a. m. Wind heavy from west. No. 2 lost  $1\frac{1}{2}$  hour in regaining her position in moving dredge No. 1; also lost three-quarters of an hour by the wind. Dredge No. 1 lost twenty minutes by losing key in dipper rollers; No. 2 lost half an hour, at 4.30, while waiting for tug at Church's. At 5 p. m. dredge No. 1 lost  $1\frac{1}{2}$  hour by breaking segment on dipper handle. Stopped work with dredges at 7.10 p. m. Had two men from dredges fixing line for new cut opposite beacon 4 from 11 a. m. to 12 m. Wind moderate at 6 p. m.; clouds heavy and moving.

Whole time lost to-day—by No. 1, 4 hours 35 minutes; No. 2, 5 hours.

No. 1. dug the most part of the day in hard material, at intervals, but so hard as to prevent her digging altogether.

*August 14.*—Both dredges began at 3.30 a. m. Dredge 2 broke crane at 6.30, and stopped to repair for rest of day. Dredge 1 stopped two hours to repair swinging lever at  $11\frac{1}{2}$  a. m.; stopped three hours to repair top of crane, (bolts loose, &c.) also stopped two hours by effects of winds. At 5 p. m. dredge 1 began, and worked till night without interruption; material, hard sand, with mixture of hard clay. Plotted some of the survey of channel; did not find it satisfactory; think the angles of some parts are not correctly taken. High wind from west most of the day, with heavy flying clouds. Work not going on very satisfactory. Whole time lost by dredge No. 1,  $7\frac{1}{2}$  hours.

*August 15.*—Dredge No. 1 began work at 3.30 a. m.; at 8.30

stopped half hour to fix rollers of crane. At 9 a. m. dredge 2 finished repairs and commenced work; dredge 1 removed on to third width of cutting to beacon 4. At 10 a. m. dredge 2 removed to same place at 10.30 a. m. At 12 m. wind strong from WNW.; dredges not able to do much work from its effects up to 6 p. m. The cause of above described removal, in consequence of hard material; dredge could not dig through it. At 4.30 dredge No. 2 let on a full head of steam, to try its effect on hard digging, and strained friction lever; lost half hour to repair; Barton & Osgood arrived at 6.15; No. 1 dredge broke upright shaft; water gauge, 3.52; material, partly hard quicksand.

It is to be understood, in all cases, that hard quicksand is not cemented, but extremely difficult to excavate. It is very adhesive and difficult to cut through, being very tough.

*August 16.*—Took tug to Church's, in company with Barton & Osgood; thence to Sault Ste. Marie. Met Mr. Ely, the superintendent; brought him back. Arrived at dredges at 6 p. m. Day very pleasant; light southeast breeze and clear sky.

*August 17.*—Dredges commenced work at 3.30 a. m. New superintendent took charge. Worked very successfully all day, without any breaking of machinery. Material, clay. Good digging done; the largest amount of work of any day since the work commenced. At 3.30 smart cold breeze from southeast; water gauge, at 2 p. m., 3.52. Messrs. Barton & Osgood left for Church's.

*August 19.*—Dredges began this morning at 3.30. It began to rain at 9 a. m., and continued up to 10.30 a. m., with strong northwest breeze and heavy flying clouds. Struck small bar of quicksand at 10.30 a. m. with dredge No. 1, which extended longitudinally in channel ten feet. At 3 p. m. lost three-quarters of an hour by breaking segment on dipper handle. At 6 p. m. wind fresh from west; sky clear and cold.

*August 20.*—Dredges commenced work at 3.30 a. m. Dredge No. 2 lost  $2\frac{1}{4}$  hours by straining turn table gearing at 12 m. Dredge No. 1 lost three hours by breaking rack of dipper handle at 2 p. m. Water gauge on Gem island, at 8 a. m., 3.60; light southeast breeze; sky clear, weather cool. Material very good digging, it being principally fine clay. Dredge No. 2 lost one hour by breaking bolt of rollers on dipper handle at 5.15 p. m. Light air from southwest at 7.30 p. m.; clear sky, day pleasant. A good day's work. Put out buoys on line on lumps left after dredge.

*August 21.*—Both dredges began work at 3.30 a. m. At 5 a. m. light breeze from south. Commenced the use of coal this a. m. on dredges. Do not approve of it, as I consider it more dangerous, unless much more carefully attended than usual with wood. Dredge No. 1 lost all day by losing dipper from handle at 8.15 a. m. Dredge No. 1 also began to strike hard material, in part, this morning at 6 a. m. Tug had to go to Sault Ste. Marie after machinery to repair No. 1 dredge. No. 2 stopped work by the effects of wind at 5 p. m. At 6 wind strong from southsoutheast, with very heavy sea; expected to see dredges go ashore. Storm moderated at m. Had to dump one scow load, as sea was washing over her so as to endanger

her sinking. Think it necessary to have much better provision against storms, in order to insure safety of dredges.

*August 22.*—At 3 a. m. wind changed to southwest; blew a smart breeze, with hazy rain. Dredge No. 2 regained her position for work at 8 a. m. No. 1 undergoing repairs. Passed very unpleasant night. Dredge 1 finished repairing at 11.30 a. m., and commenced work; but neither dredge can do much work, from effects of wind, which blows strong from west, with hazy rain and heavy clouds at 12 m. At 1 p. m. rain ceased and wind increased, and kept up during the day. Dredges stopped at 3.30 p. m., and removed to shallow water to anchor and prepare in case of another storm. At 6.30 p. m. wind strong from the west, up to 6 a. m. 23d, when it moderated. Material, sand and clay, and tolerably good digging.

*August 23.*—At 6 a. m. wind fresh from west; lasted all day, with flying clouds and clear sky near horizon. Tug went up to Church's after new dippers. Could not go to island for the last two days on account of the wind.

*August 24.*—Commenced putting in new dippers this morning. Got them ready and removed dredge No. 1 to hard sand digging, to beacon 2, 280 feet, at 8.30 a. m. New dippers do not work well in the hard sand. No. 2 dredge commenced at 8 a. m., and removed to near beacon 4, to dig against current. No. 1 lost 1½ hour by breaking turntable chain. Buoys all displaced by effects of storm; replaced some of them. Morning pleasant, with light air from southeast; at 2.30 thunder shower three-quarters of an hour. Dredge No. 1 broke pinion of dipper handle at 5.30 p. m.; none to replace it. Dredge No. 1 from 8.30 a. m. to 5.30 p. m. digging 40 cubic yards. Sand very hard to dig, but not cemented. Water gauge on Gem island 3.82 at 4.30 p. m., with light wind from southwest; light clouds; evening fine.

*August 25.*—Dredge 1 commenced work at 3.30 a. m. Light breeze from northeast; clear sky. Dredge 1 likely to be idle for several days. Dredge 2 is digging against the current from bed 4 to meet dredge 1 on first line of cutting. Material, sand, with mixture of clay; not as hard as what is generally called hard quicksand or hard sand. At 6 p. m. light breeze from southwest, with light moving clouds. Water gauge on Gem island, at 3.20 p. m., 3.78. The material during the day has been much mixed, viz: 1, soft sand on top; next, about two feet of hard quick sand; and next, on bottom, one foot soft clay. At 9 p. m. light breeze from southwest, with clear sky. Got seven pounds of rope to-day at Church's to make buoys.

*August 26.*—Dredge No. 2 commenced work at 4 a. m.; worked all day without breaks; struck hard quicksand at 11 a. m. Tug went down river 12 m. for a supply of wood; at 6 a. m. light air from S., with light moving clouds; evening fine; material very hard quicksand (bad digging;) found difficulty to get superintendent to keep tug, &c., from throwing down buoys and beacons; North Star passed; Captain Whipple on board; day pleasant.

Amount excavated to-day, 198 cubic yards.

*August 27.*—Dredge No. 2 commenced work at 4 a. m.; rained at 4 a. m., lasted twenty minutes; at 6 a. m. dredge No. 2 lost three hours

by breaking pinion of dipper handle; water gauge on Gem island at 7 a. m., 3.74; nothing pleasant, with light NNE. breeze and light moving clouds; Captain Whipple arrived at 9 a. m.; went in company with him, and bored through several places in the material of middle channel; found some hard quicksand and some soft clay; bored through hard sand in cut No. 1, between beacon 4 and beacon 2; think the material is harder in cut No. 1 than in middle channel; at 2 p. m. commenced light rain, hazy for remainder of day; at 6 p. m. light breeze from NNE., with heavy moving clouds and some rain. Professor Williamson arrived last night to relieve me of the charge here, but has concluded not to stay, and went to Church's on tug at 5 p. m.; material, hard quicksand. Amount of material excavated and removed to-day by dredge No. 2, in sum total, is only 40 yards, being the smallest day's work, not having any pinions to replace those broken.

*August 29.*—One dredge destroyed by fire last night; hull towed to Sugar island. No excavation performed to-day.

*August 30, (Sunday.)*—The damaged machinery taken from hull of dredge.

*August 31.*—The remaining dredge set at work at the head of cut No. 2.; excavated 160 yards. Captain Whipple and Mr. Dunnier returned to Detroit, leaving H. W. Allen in charge as acting sub-agent.

*Daily record of amount of excavation at the flats of Lake George, in St. Mary's river, under the direction of Capt. A. W. Whipple, during the months of July and August. Messrs. Barton & Osgood, contractors; M. C. Dunnier, United States sub-agent.*

Date.	Hour of deposit.	No. of yds. deposited.	Quality of material.	Remarks.
1857.				
July 14	-----	50	Principally clay, partly mixed with sand.	
	-----	50		
	-----	50		
	-----	45		
	Total..	195		
July 15	9. 10 a.m.	53. 50	Clay, with very little sand.	
	12. 10 p.m.	50		
	3. 45	42. 75		
	4. 30	50		
	7. 00	43. 40		
	Total..	239. 65		
July 16	7. 30 a.m.	50	Clay, with little sand.	
	7. 30	50		
	10. 15	50		
	2. 20 p m.	50		
	5. 40	37		
	5. 40	50		
	Total..	287		
July 17	5. 40 a.m.	50	Clay and a little sand.	
	1. 00 p m.	53		
	1. 00	50		
	2. 00	53. 90		
	3. 50	47		
	5. 40	50		
	7. 15	50		
	8. 40	50		
	Total..	403. 90		
July 18	5. 40 a m.	50	More than usually sandy.	
	7. 35	48		
	9. 00	50		
	1. 50 p.m.	48		
	2. 45	47		
	4. 40	50		
	7. 15	50		
	9. 10	45		
	Total..	388		



DAILY RECORD—Continued.

Date.	Hour of deposit.	No. of yds. deposited.	Quality of material.	Remarks.
1857. July 20	6. 00 a.m. 4. 40 p.m. 6. 15 8. 00	53. 10 50 50. 50 50	Principally sand, harder than usual.	
	Total..	204. 60		
July 21	7. 10 a.m. 9. 30 12. 30 p.m. 4. 00 7. 15	40 50 48 48 48	Very hard quicksand.	
	Total..	234		
July 22	9. 30 a.m. 10. 25 2. 40 p.m. 5. 30 6. 00 6. 40 9. 15 9. 15	50 50 50 50 55. 17 53 50 27	Very hard quicksand.	Dredge No. 1, being ahead, struck very hard quicksand, of which 38 yards may be called exceedingly hard. In consequence of the exceeding hardness of material, removed dredges 900 feet ahead.
	Total..	385. 17		
July 23	6. 30 a.m. 7. 10 7. 10 8. 15 8. 45 9. 50 10. 45 11. 15 12. 30 p.m. 1. 00 1. 40 2. 40 2. 40 6. 35 7. 30 7. 30 8. 15 8. 15	100 53 46. 29 50 52. 28 50 48 50 50 51. 50 50 52 50 105. 17 50 48 54 26	Very fine clay.	
	Total..	1, 036. 24		
July 24	5. 55 a.m. 5. 55 7. 18 10. 00 10. 30 11. 20	50 50 52. 28 50 52. 28 50	Very fine clay, overlaid with a stratum of mud and coarse sand.	Good to excavate.

## DAILY RECORD—Continued.

Date.	Hour of deposit.	No. of yds. deposited.	Quality of material.	Remarks.
1857. July 24 (Cont'd.)	12.00 m. 4.00 p m. 4.30 4.30 7.00 8.10 8.10 8.10 8.10	52.28 52.28 50 52 52 50 50 50 25		
	Total..	738.12		
July 25	9.30 a.m. 2.00 p.m. 3.00 3.00 4.10 4.50 5.30 6.10 8.00 8.00	50 52 50 52 52 50 53 50 50 50	Crossed a small bar of hard sand. Material generally good, being very fine clay.	Examined depth of water in channel dredged. Found bottom quite regular, from 13½ to 14½ depth.
	Total..	559		
July 27	6.50 a.m. 8.00 8.30 9.10 10.30 11.00 12.40 p.m. 1.20 2.30 3.30 4.00 8.00 8.00	54.56 52 50 50 50 50 52.28 52.28 52.28 50 50 53 53	Sand and clay.	Good material. An 18-in. stratum of sand on top. Water gauge on Gem island at 10 a.m., to-day, reads 3.55 feet.
	Total..	669.40		
July 30	1.15 p.m. 1.15 2.20 2.20 5.00 6.20	50 50 53.10 52.33 50 47	Mixture of sand and clay, with a few hard spots.	Tug St. Mary on fire last night; took till noon to repair her. Delay to dredges in consequence.
	Total..	302.43		



## DAILY RECORD—Continued.

Date.	Hour of deposit.	No. of yds. deposited.	Quality of material.	Remarks.
1857. Aug. 4	4.50 6.30 8.00	52.23 54.66 45		
	Total..	939.26		
Aug. 5	5.40 a.m. 7.30 9.15 9.15 11.40 12.45 p.m. 12.45 2.40 7.00 7.00 8.00 8.00	50 53.10 53.88 53.88 53.88 53.88 52.23 52.23 52.23 52.23 53.10	18 cubic yards hard sand.  12 cubic yards hard sand.	Dredge No. 1 struck bar of hard sand at 8 a. m.  Dredges lost from 5 p. m. till night, waiting for tug while it was at Church's for wood.
	Total..	634.52		
Aug. 6	6.30 a.m. 6.30 7.45 8.00 10.40 10.40 12.00 m. 12.00 1.40 p.m. 3.30 7.00 7.25 7.25	55.17 50 52.23 53.88 54.66 48 53.88 53.88 52.25 54.66 54.66 54.66 52.23	Material generally good; chiefly clay, with an occasional mixture of sand.  12 yards hard material.	Dredge No. 2 lost two hours by breaking machinery. Dredge No. 1 lost one and a half hour by breaking machinery.
	Total..	690.14		
Aug. 7	6.20 a.m. 6.20 8.10 8.10 10.00 10.00 11.15 12.15 p.m. 12.50 1.40 3.15 5.15 6.10 7.00	53.88 53.88 50 53.88 50 53.88 53.88 55 52.23 53.88 53.10 53.88 50 55	Hard sand.	Dredge No. 1 struck hard sand at 11 $\frac{1}{2}$ a. m. Filled one scow from that time to 6.15 p. m.—6 h. 45 m. Hard point at 375 feet back of beacon 6. Rate of current from beacon 2 to beacon 6 = 1,215.31 feet per hour.
	Total..	738.61		

DAILY RECORD—Continued.

Date.	Hour of deposit.	No. of yds. deposited.	Quality of material.	Remarks.
1857. Aug. 8	6. 10 a.m. 7. 30 9. 00 1. 40 p.m. 4. 15 5. 30 7. 00 7. 00	55 55 55 53.88 52.23 53.88 25 50.00	25 yards hard material. Hard sand.	Afternoon windy. Dredges not working well. Dredge No. 2 struck hard material at 3.30 p. m., and removed at 6.30 ahead of beacon 4.
		399.99		
Deduct amount dug outside chan'l line.		*50.00		
	Total--	349.99		
Aug. 10	5. 50 a.m. 6. 25 7. 15 8. 10 9. 00 11. 40 11. 40 1. 00 p.m. 1. 00 1. 50 2. 30 5. 50 5. 50 7. 00 7. 00	50 50 50 50 52.23 50 53.88 50 52.23 53.88 53.88 53.88 55 55 53.88	Material to-day consists of sand and clay, and is quite soft.	Water gauge on Gaisland reads 3.63 at 6 p. m. Wind light, from SE.
		783.86		
Aug. 11	5. 30 a.m. 6. 30 7. 00 7. 50 8. 30 9. 00 10. 00 11. 30 12. 30 p.m. 1. 15 4. 00 5. 30 6. 30 7. 30 7. 30	53.88 50 52.23 50 52.23 50.00 53.88 53.88 55 50 53.88 53.88 50 42.25 44.83		
	Total--	765.94		

\*This amount not allowed, because dug outside of channel line.

## DAILY RECORD—Continued.

Date.	Hour of deposit.	No. of yds. deposited.	Quality of material	Remarks.
1857. Aug. 12	6.00 a.m.	50	Sand and clay; harder than usual for such quality of material.	At 2.30 p. m. water gauge on Gem island reads 3.76 feet.
	6.00	50		
	8.30	50		
	8.30	50		
	10.40	53.88		
	11.20	53.88		
	11.50	55		
	12.40 p.m.	50		
	3.30	50		
	5.00	53.88		
	6.20	50		
	7.00	47.83		
	Total.	614.47		
Aug. 13	5.35 a.m.	50	To-day rather hard. In part hard sand, with some clay. Not cemented. Very difficult to dig with large dip-pers.	
		50		
		50		
		52.23		
		50.		
		52.23		
		53.88		
	Total..	358.34		
Aug. 14	5.00 a.m.	50	Material pretty hard nearly all day. 20 yards hard sand.	
	5.00	50		
	8.30	50		
	8.30	50		
	4.00 p.m.	40.30	All hard.	
	Total..	240.30		
Aug. 15	5.30 a.m.	53.88	Dredge removed to commencement of soft material. Had to encounter some hard before coming on to good digging. Dug 30 yards of hard sand.	At 10.30 and 12.30 wind blows heavily from WNW. Dredges cannot move and keep their position. Heavy sea. Messrs. Barton and Osgood arrived at 6.15 p. m.
	8.50	50		
	3.00 p.m.	46		
	5.00	50		
	7.00	16		
	7.00	50		
	Total..	265.88		
Aug. 17	5.30 a.m.	50	Very good; chiefly fine clay mixed with sand, being soft.	Water gauge at 11.15 a.m. reads 3.52 feet.
	6.30	50		
	7.15	50		
	7.15	52.23		
	8.25	50		
	9.00	52.23		
	9.40	51.50		
	10.20	52.23		
	11.30	50		
	12.00 m.	50		
	12.00	50		

DAILY RECORD—Continued.

Date.	Hour of deposit.	No. of yds. deposited.	Quality of material.	Remarks.
1857. Aug. 17 (Cont'd.)	1.45 a.m.	52.23		
	1.45	50		
	4.30	53.88		
	4.30	53.88		
	5.00	53.88		
	5.00	53.88		
	7.00	50		
	7.00	53		
	7.30	53.88		
	Total..	1,034.82		
Aug. 18	6.00 a.m.	53.88		
	6.00	53.88		
	7.15	59.32		
	7.15	54.66		
	8.00	53.88		
	8.00	56.20		
	9.15	57.70		
	9.15	53.88	Principally fine soft clay.	Very good excavating. No breaking machinery. Day fine.
	10.20	53.88		
	10.20	53.88		
	11.50	60		
	11.50	55		
	12.00 m.	57.70		
	12.00	55		
	1.20 p.m.	56.22		
	2.00	56.22		
	2.40	53.88		
	2.40	56.22		
	3.30	56.23		
	3.30	55		
	4.40	53.88		
	5.00	52.23		
	7.00	53.88		
	7.00	56.22		
	Total..	1,328.85		
Aug. 19	6.30 a.m.	-----		
	6.30	-----		
	8.15	-----	Fine clay.	Dredges interrupted by breaking machinery.
	8.30	-----		
	9.00	-----		
	9.45	-----		
	11.20	-----		
	1.20 p.m.	-----		
	2.30	-----		
	3.00	-----	Very good.	
	4.00	-----		
	7.50	-----	Fine clay; a little fine sand.	
	8.40	-----		
	Total..	787.93		



## DAILY RECORD—Continued.

Date.	Hour of deposit.	No. of yds. deposited.	Quality of material.	Remarks.
1857. Aug. 20	5.30 a.m.	-----		
	6.00	-----		
	6.00	-----		
	6.50	-----		
	7.15	-----		
	8.00	-----		
	8.50	-----		
	8.50	-----		
	10.00	-----		
	10.00	-----		
	11.00	-----		
	11.00	-----		
	1.30 p.m.	-----		
	2.40	-----		
	5.15	-----		
	5.15	-----		
	7.00	-----		
	7.00	-----		
	Total--	998.19		
Aug. 21	5.30 a.m.	-----	Fine clay.	Good excavating.
	7.00	-----		
	8.00	-----		
	9.30	-----		
	11.30	-----		
	12.30 p.m.	-----		
	5.00	-----		
	5.00	-----		
	Total--	404.99		
Aug. 22	10.45 a.m.	-----	Sand and clay.	Good digging.
	1.10 p.m.	-----		
	1.40	-----		
	5.30	-----		
	5.30	-----		
	Total--	245.14		
Aug. 24	9.13 a.m.	-----		Put new dipper in operation.
	11.00	-----		
	1.15 p.m.	-----		
	5.20	-----		
	6.40	-----		
	7.45	-----		
	Total--	306.51		
Aug. 25	6.40 a.m.	-----		
	11.30	-----		
	11.30	-----		
	1.00 p.m.	-----		

DAILY RECORD—Continued.

Date.	Hour of deposit.	No. of yds. deposited.	Quality of material.	Remarks.
1857.				
Aug. 25	2. 00 p.m.	-----		
(Cont'd.)	4. 30	-----		
	6. 40	-----		
	Total--	373.86		
Aug. 26	7. 30 p.m.	40.30	Very hard quicksand.	
Aug. 27	8. 00 a.m.	-----		
	11. 00	-----		
	1. 40 p.m.	-----		
	7. 30	-----		
	Total--	179		
Aug. 28	10. 20 a.m.	-----	Hard quicksand.	Dredge No. 2 broke down.
	10. 50	-----		
	3. 00 p.m.	-----		
	Total--	105		
Aug. 31	5. 00 p.m.	55	Hard clay and sand, changing to soft clay.	One dredge destroyed by fire on the night of August 28.
	7. 15	53		
	10. 00	52		
	Total--	160		
Total for	August ---	13,435.75		

ST. MARY'S RIVER IMPROVEMENT,  
*Lake George, August 31, 1857.*

SIR: Herewith I respectfully submit the following estimate of the amount of dredging done on Lake George during the month of August, 1857, with a report of the proceedings in connexion with the work during the month:

August 1	number of cubic yards excavated by dredging,	200.00
3	do do do do do do do do	189.85
4	do do do do do do do do	939.26
5	do do do do do do do do	634.52
6	do do do do do do do do	690.14
7	do do do do do do do do	738.61
8	do do do do do do do do	349.99
10	do do do do do do do do	783.86
11	do do do do do do do do	765.94
12	do do do do do do do do	614.17
13	do do do do do do do do	358.34
14	do do do do do do do do	240.30
15	do do do do do do do do	265.88
17	do do do do do do do do	1,034.82
18	do do do do do do do do	1,328.85
19	do do do do do do do do	787.93
20	do do do do do do do do	998.19
21	do do do do do do do do	404.99
22	do do do do do do do do	245.14
24	do do do do do do do do	306.50
25	do do do do do do do do	373.86
26	do do do do do do do do	40.30
27	do do do do do do do do	179.00
28	do do do do do do do do	105.00
31	do do do do do do do do	160.00
Total		13,435.75

The progress of dredging in a continuous line has been interrupted by coming in contact with hard quicksand, which was found almost impossible to dredge with the machinery used; and, in order to give the contractors sufficient time to prepare proper machinery, I have, according to your directions, removed them to soft material. The new dippers having arrived on the 24th instant, and, being placed to work, are found incapable of dredging successfully the hard parts left. But I am of the opinion that dippers can be constructed—the plan of the cutting part of which will somewhat resemble the letter V, having on the edge of them a sufficient number of teeth on the entire face—which would be most likely to prove successful in dredging.

The material in the west channel is chiefly good. There are, however, in the portions of it that are known, as cuts 1 and 2, some hard quicksand. Cut No. 1 is 2,700 feet long, of which 1,170 feet, for the

entire width of the channel, is hard quicksand, not cemented, but extremely difficult to be dredged. Cut No. 2 is 1,300 feet long, of which there are about 400 feet hard quicksand, which extends about one-third of the width of the channel. The entire length of the west channel is about four miles, and has spaces of deep water between cuts Nos. 1 and 2, and also between cuts 2 and 3. On cut 3 the present bed of the river is very uneven. I have, according to your directions, bored and examined the material through the whole length of the west channel, and made an estimate of the quantity of material required to be excavated in order to have 14 feet of water for its entire length, and a channel 300 feet wide; by which I find that the total quantity of excavation therein is about 480,000 cubic yards, of which there are about 40,000 cubic yards hard quicksand. I have also, while in company with you on the 28th instant, made some examinations, by boring, &c., in the main west channel; and, according to your directions, I have made a more full and accurate examination on the following day, by which I find that the total amount of dredging required on that channel in order to make it navigable—300 feet wide and 14 feet deep—is about 240,000 cubic yards, of which there are about 35,000 cubic yards hard quicksand. The entire length to be dredged is about three-fourths of a mile.

While making these examinations, I had with me the superintendent and cashier of Messrs. Barton & Osgood, each of whom concurs with me decidedly in choice of the dredging of the main west channel, there being less hard sand\* in it than in the west channel, the total amount of dredging being only about half as much as in the west. It has also the advantage of being a very direct route across the lake, only making one turn, and that at a point where the present water is twelve feet deep for nearly a width of a quarter of a mile; and I am of opinion that it curtails the distance not less than one mile, when compared with the west channel. The portion of the west channel which is dredged is in cut No. 1, and commences at beacon 2; runs thence 580 feet, its width being 120 feet. At this point hard material is encountered, and we are compelled to pass over 846 feet of hard sand in the same continuous line, when soft material is again found, and continues for a distance of 950 feet, when we are again compelled to stop. This makes the whole length dredged equal to 1,530 feet, by 120 feet wide, and 14 feet deep, the location of which can be more fully understood by reference to the annexed sketch, No. 1.

In compliance with your directions, I have measured the current on cut No. 1, between bed 2 and bed 6, the velocity of which I find to average, in the whole distance, 1,245.3 feet per hour; from which it appears that there is more velocity in the current at the head of the cut than at the lower end. It also appears that the current bears in the direction of Gem island, as shown in sketch No. 2.

By a comparison of the height of water daily recorded, taken from the water gauge erected on Gem island, I find that the water has risen gradually within the last two months 0.28 foot, and in a few

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\* This appears to be less hard than that found in the extreme west channel.

instances previous to a storm it has risen 0.5 foot in one day, but receded to its standard in a short time. It is generally said by residents of this place that the present stage of water is about 2 feet higher than it has been three or four years ago.

On the night of 28th August, through the watchman's carelessness in preparing the lamps, fire was communicated to some waste cotton packing, and thence to dredge No. 2, on which several of us slept. About 2 a. m. on the following morning I discovered the fire before it had made much progress. I gave the alarm, and in less than five minutes from the time of its discovery we had much difficulty in saving our lives, without any possibility of saving any property, not even our clothing. One of the men was seriously burned before he could escape. The loss of property consisted exclusively of the amount each person had on board. Mine exceeds \$300, including a valuable gold watch, clothing, and money. I have saved all the records in connexion with the work. The time being so short, and being almost suffocated with smoke, I was compelled to abandon my own property.

The hull of the dredge appears as though it can be repaired, and the machinery is not very much injured. I therefore think that, with energetic superintendence, she could be repaired and fitted for use in one month from this time. In the meantime the superintendent is going to keep our dredge at work day and night, and prepare camp ground on Gem island.

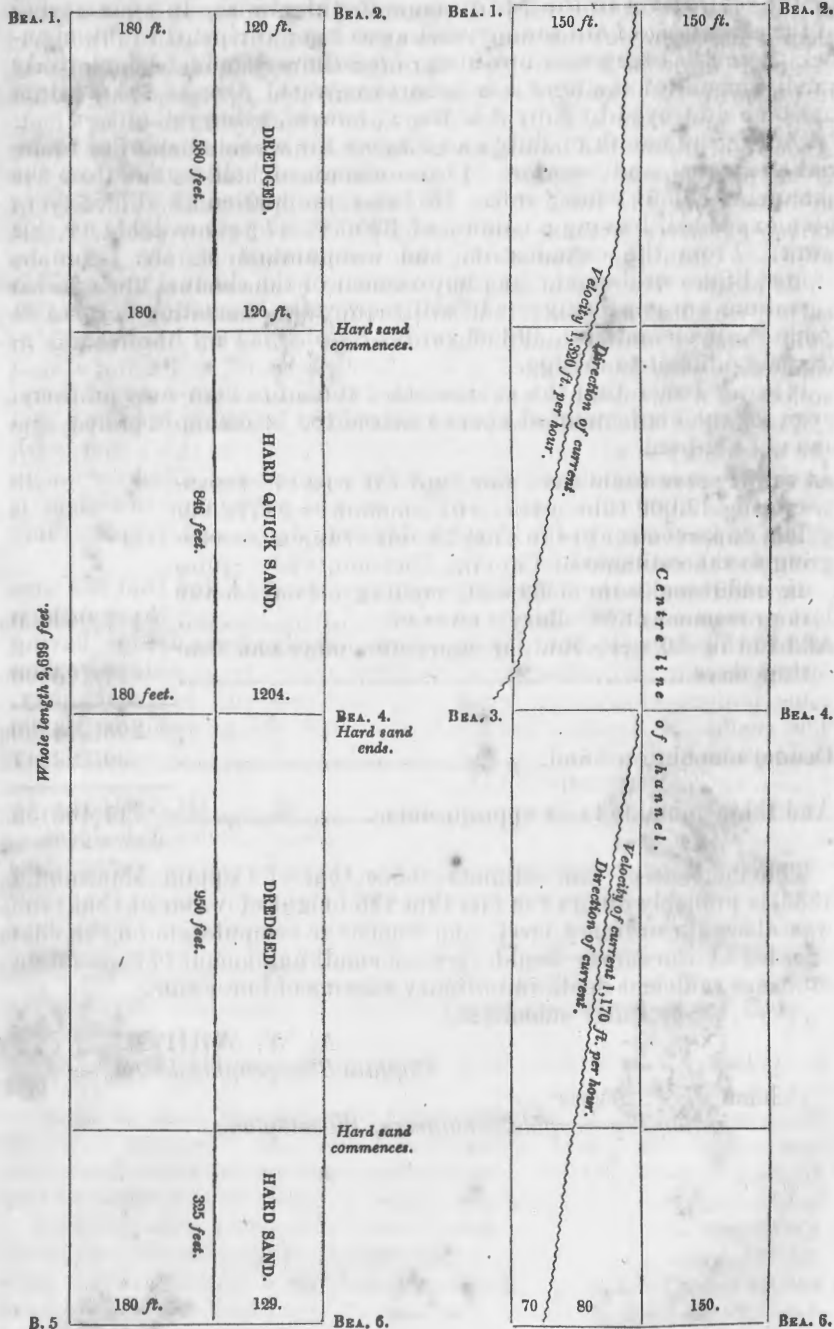
By reference to the journal of daily operations, I find that the time lost by repairing machinery and effects of wind, during the month, is equal to  $7\frac{1}{2}$  days (16 hours each) for each dredge—one dredge having lost  $4\frac{1}{2}$  days in succession, in consequence of not being able to replace some pinions which were broken in connexion with her machinery. The amount of dredging for the next month will probably be 10,000 cubic yards.

Very respectfully,

M. C. DUNNIER,  
*United States Sub-Agent.*

SKETCH No. 1.

SKETCH No. 2.



The preceding extracts from the journal and report of operations in St. Mary's river show that several difficulties have been encountered by the contractors in the performance of this work. In consequence of the existence of hard sand, such as was not anticipated in this channel, there has been much breaking of machinery, and a comparatively small amount of material has been excavated. One of the dredges has been destroyed by fire; it is now, however, being re-built.

During the month of July and August the whole amount of material excavated and removed to the distance of half a mile from the channel is 20,501 cubic yards. Of the appropriation \$9,717 53 have been expended, leaving a balance of \$90,282 47 yet available for this work. From the examination and computation of Mr. Dunnier, United States sub-agent, the improvement of the channel upon which operations are now being made will require an excavation of 480,000 cubic yards of material, 40,000 yards of which is very hard sand, extremely difficult to dredge.

It is my belief that the contractors intend to claim an additional price for the hard material above referred to, believing it to be a species of hard-pan.

At thirty-seven cents per cubic yard the cost of excavating 480,000 cubic yards will amount to \$177,600.

The improvement of the East Neebish rapids, according to the estimate of Captain Macomb, will require an additional sum of \$9,440, making a total for the improvement of St. Mary's river of.....	\$187,040 00
Add to this 10 per cent. for superintendence and contingencies.....	18,704 00

	205,744 00
Deduct amount on hand.....	90,282 47
And there remains to be appropriated.....	115,461 53

The increase of this estimate above that of Captain Macomb in 1853 is probably due to the fact that the height of water at that time was above its ordinary level, and hence the computation on the data afforded by the survey would give too small an amount of excavation to insure sufficient depth in ordinary seasons of low water.

Respectfully submitted,

A. W. WHIPPLE,  
*Captain Topographical Engineers.*

Colonel J. J. ABERT,  
*Chief Topographical Engineers, Washington.*



*Epitome of annual report, September 1, 1857, to Bureau of Topographical Engineers.*

1. DEEPENING CHANNEL OVER ST. CLAIR FLATS.

For this operation a contract with Theodore D. Barton, of Buffalo, to excavate, at 30 cents per cubic yard, was approved by the Secretary of War June 22, 1857.

Operations were commenced on the 1st of July following. They were interrupted by much stormy weather.

The total amount excavated in the month of July was 14,159 cubic yards—1,158.5 being the greatest number of yards dredged in one day.

In August the excavation amounted to 9,261 cubic yards—1,367 yards having been the greatest day's work. The material removed consists of coarse sand, fine sand, and an occasional admixture of clay or mud. A cut between forty and forty-five feet in width, and about fourteen feet in depth, has been excavated entirely through from the river channel to the deep water of the lake. This has caused an increase in the velocity of the current threading the cut. It is desired to complete this channel during the summer of 1858, and the contractor promises to put on the work sufficient machinery to accomplish it. For this purpose an additional appropriation of \$23,421 will be required.

2. CONSTRUCTION OF FOUNDATION FOR A LIGHT-HOUSE AND A BEACON-LIGHT ON ST. CLAIR FLATS.

The plans for these structures have not been approved, and no expenditures will probably be made until the strata upon which the foundations should rest have been examined.

3. FOR DEEPENING THE CHANNEL OF ST. MARY'S RIVER.

A contract for this improvement was entered into with Barton & Osgood, and approved by the Secretary of War, April 24, 1857.

The prices for excavation were—

First. For all earth, such as sand, gravel stone, or clay, not cemented, the sum of 37 cents per cubic yard.

Second. For hard-pan, or cemented sand and clay, \$1 50 per cubic yard.

Third. For rock measuring above half a cubic yard, \$10 per cubic yard.

Dredging was commenced July 14. The material excavated proved to be partly fine clay, occasionally mixed with sand, and partly sand without clay, and in some places so hard as to be dredged with considerable difficulty. In July the excavated material amounted to 7,226 $\frac{44}{100}$  cubic yards—the greatest amount in any one day being 1,036 $\frac{24}{100}$  cubic yards. In August the best day's work was 1,328 $\frac{86}{100}$  cubic yards, and the total removal 13,435 $\frac{25}{100}$ . The United States sub-agent reports that there remains to be excavated from the extreme west channel about 480,000 cubic yards; of this there are about

40,000 cubic yards of hard material, for which the contractors will claim a greater price than for the rest; but at 37 cents per cubic yard, an estimate for the completion of the improvement of this channel would be as follows, viz:

480,000 yards of excavation, at 37 cents.....	\$177,600 00
Improvement of E. Neebish rapids (as per Captain Macomb's estimates).....	9,440 00
Ten per cent. for superintending and contingencies.....	18,704 00
Total.....	205,744 00
Amount on hand.....	90,282 57
Additional appropriation required.....	115,461 53

Respectfully submitted.

A. W. WHIPPLE,  
*Captain Topographical Engineers.*

Colonel J. J. ABERT,  
*Chief Topographical Engineers, Washington, D. C.*

## APPENDIX G.

### UNITED STATES STEAMER SEARCH, *Saginaw Bay, Michigan, September 18, 1857.*

SIR: I have the honor to submit the following report of the progress of the survey of the north and northwest lakes during the past year, together with an estimate of funds required for future operations.

By special orders No. 70, dated "Adjutant General's Office, Washington, May 20, 1857," I was placed in command of the survey; the health of Lieutenant Colonel James Kearney, topographical engineers, till then in command, requiring his relief from duty. All references, therefore, to matters in this report prior to the above named date, it will be understood, were under the direction of Lieutenant Colonel Kearney.

For the purpose of more clearly stating the character and progress of the survey, I have divided this report into the following several heads:

- I. Office work of the past winter and spring.
- II. Field operations of the present season.
- III. Drawing and reduction of charts and engravings.
- IV. Plan of future operations, and estimate of funds for the same.

#### OFFICE WORK.

At the date of the last annual report the parties had just returned from the field, with the exception of one, engaged in completing the

survey of the St. Clair flats, who did not get through with the work, owing to the unfavorable character of the weather, until the 20th of November.

The different parties were engaged during the winter and spring in making the requisite computations and projecting from the field notes the detailed sheets of their work. A brief summary of the amount of this work is all that is deemed necessary to give here, as the bureau has been fully advised of the details by the monthly reports. One sheet, scale  $\frac{1}{16000}$ , of south shore of Saginaw bay; one sheet, scale  $\frac{1}{16000}$ , of west shore of Saginaw bay; one sheet, scale  $\frac{1}{16000}$ , of Saginaw river and bar, comprised the field work executed by W. H. Hearing and assistants, and included 1,874 square inches of hydrography and topography.

Two sheets, scale  $\frac{1}{16000}$ , of northwest shore of Saginaw bay; one sheet, scale  $\frac{1}{16000}$ , of harbor of Towas, Saginaw bay, including 1,624 square inches of hydrography and topography, were executed by G. W. Lamson and assistants.

In addition to the above maps, the parties of Assistants Hearing and Lamson jointly drew the sheet, scale  $\frac{1}{16000}$ , of the delta of the St. Clair, comprising an area of 1,500 square inches.

One sheet, scale  $\frac{1}{16000}$ , of the Charity islands, Saginaw bay; one sheet, scale  $\frac{1}{16000}$ , of the east shore of Saginaw bay; one sheet, scale  $\frac{1}{16000}$ , including the Charity islands and east shore; and one sheet, scale  $\frac{1}{128000}$ , compilation of the whole of the bay, were drawn by D. F. Henry and assistants, and included the field-work of this party, covering a space of 1,500 square inches of minute hydrography.

Second Lieutenant C. W. Turnbull, topographical engineers, was employed during the winter in computing his astronomical observations at the Charity islands. Early in the spring, a lot suitably located having been gratuitously loaned to the survey, through the courtesy of John Hull, esq., of Detroit, a rough building to protect the instruments was erected on it, and Lieutenant Turnbull was employed in making observations for latitude and longitude till the period for taking the field arrived.

The hired men of the survey, whom it is deemed necessary to retain during the winter, were usefully employed in repairing and putting in order the tents, camp equipage, &c., and, early in the spring, on the steamers and boats, making the alterations and repairs which experience and usage had proved to be necessary.

#### FIELD OPERATIONS OF THE PRESENT SEASON.

Upon assuming the command of the survey, the following organization for the field was adopted:

1. A primary triangulation and off-shore hydrography party, to be directed by myself in person on board the steamer Search.
2. An astronomical and magnetic party, under the charge of Second Lieutenant Turnbull, topographical engineers.
3. Three shore line topography and hydrography parties, under the several commands of Second Lieutenant O. M. Poe, topographical engineers, Assistants W. H. Hearing and G. W. Lamson.

The operations of each of these parties will be narrated in the order they are above enumerated.

*Primary triangulation and off-shore hydrography.*—As stated above, at the commencement of the season, the execution of this duty was assumed by myself on board the steamer Search, assisted therein by Assistant J. A. Potter. The steamer was placed in commission early in May, but for some time was employed in transporting the other parties to the field and placing them in position.

Having accomplished this duty, the greater part of the season has been occupied in making reconnaissances for the selection of sites, and in building stations of suitable elevation to command the view. Owing to the very unfavorable character of the shores of Saginaw bay, in order to obtain the best triangles it has been found necessary to build more stations of the maximum height than has heretofore been usual; a greater consumption of time has in consequence been required.

Hence, as the season advanced, I clearly perceived that to discharge the duties of superintendent, requiring frequent visits to the parties, to watch their progress, give instructions, make payments, and furnish supplies, and at the same time complete the triangulation and off-shore hydrography, would be impossible. As the execution of the latter duty was more practicable consistently with my duties as superintendent, I determined to confine my personal share of the work to this and the measurement of the base line. I accordingly, early in August, placed the steamer Surveyor in commission, detaching from the Search the necessary number to form the officers and crew, increasing thus in a slight degree only the general expenses of the survey.

As soon as the Surveyor arrived in the bay, I assigned Second Lieutenant O. M. Poe, topographical engineers, to the command and to the duty of observing the angles of the main triangulation, I having by that time accomplished the work of projecting the scheme of triangles and built the stations at the proper sites.

Since Lieutenant Poe has entered on this duty, every hour of available weather has been taken advantage of to observe, and such progress has already been made that there is no doubt the triangulation of that portion of Saginaw bay above the Charity islands will be completed this season.

Lieutenant Poe was supplied with the two largest theodolites belonging to the survey, one manufactured by William Wurdemann, of Washington, the limb being a ten inch vertical circle of a Gambey theodolite, the other a ten inch theodolite by Gambey. Both these instruments are repeating, and graduated to five seconds.

Lieutenant Poe was instructed to make numerous repetitions of each angle, with the telescope direct and reversed, and to do the same with the instrument re-centered. The results of Lieutenant Poe's observations are extremely satisfactory, and I am quite satisfied that, in proportion to the character of the instruments, they will compare favorably with any triangulation of similar extent. This is the more creditable to Lieutenant Poe, as this is his first season in the field

since leaving the Military Academy. In the appendix (No. 21) will be found the details of Lieutenant Poe's work up to the 15th instant.

Since the completion of the triangulation stations and the assignment of Lieutenant Poe to observing the angles, I have been enabled to execute a considerable portion of the off-shore hydrography, so that by the close of the season I fully expect to have minutely sounded the whole of the bay included above the Charity islands. In this duty, as well as in numerous others pertaining to my position as superintendent, I have been most by Assistant J. A. Potter, whose long connexion with the work and familiarity with details, render his services of special importance to one who, like myself, having been recently attached, am, in a measure, new to the position.

In the Appendix (No. 1) will be found a resumé of the work executed by the party on the steamer Search, to include the 15th instant, from which it will be seen how actively this vessel has been employed; and it affords me satisfaction to report, that the steamer does great credit to its builders, Messrs. Merrick & Sons, of Philadelphia, as its adaptability for the service has been most fully proved this season.

As soon as the hydrography is completed, which I expect will be by the close of the present month, I shall proceed to measure the base line. The position of this line on Sand Point was selected last season, and at that time the whole line was opened for a space of forty feet, and all trees, stumps, &c., removed for a space of twenty feet.

This season the preparation of the ground has been continued under the general direction of Lieutenant Turnbull, topographical engineers, whose observatory is situated in the immediate vicinity.

The first operation was to erect stations at each of the termini of the proposed line of sufficient altitude for both to be visible from any point of the line. This, owing to the inequalities of the ground, required these stations to be of the maximum height, and as it was of importance to commence the triangulation without waiting for the measurement, two triangulation stations were built by the party of the steamer Search. The line between these stations was then carefully traced by Assistant James Carr, furnished with a six-inch Wurdemann theodolite, and afterwards accurately levelled. A profile being thus obtained, and the most favorable grades requiring the least work having been projected, Assistant Carr laid out the line with grade stakes, showing the cutting and embankment throughout its whole length.

Finding it to be the most economical arrangement both in time and money, I procured from neighboring farmers two yoke of oxen, with ploughs and road scrapers; and with those and a few men under the immediate direction of Assistant William Casgrain, the line has, to date, been graded for three-quarters of its length, and with uniform grades all under two degrees.

By adopting this course the time of measurement will be reduced to the mere time of manipulating the machine; and as the line is traced over firm sand, this operation will be performed under the most favorable circumstances, not only reducing the time required to effect it, but proportionately the expense.

Having noticed in the report of Captain T. J. Lee, topographical

engineers, of the measurement of the Mackinaw base, that there was reason to apprehend a derangement of the compensation apparatus of one of the tubes, I applied and obtained from the bureau the authority to employ the maker, Mr. Wurdemann, to examine, adjust and, if necessary, correct any derangement of the apparatus that might be detected. Mr. Wurdemann arriving early in June, after a cursory examination, satisfying him there was nothing to be done that could not be executed in the field, the apparatus was carefully transported in the steamer Search from Detroit to Sand Point in Saginaw bay, where a suitable frame building for its protection was erected. The apparatus and comparata were then set up, and numerous comparisons made during successive days from daylight to dark, so as to get the greatest range of the thermometer, the more readily to detect any want of compensation.

The result proved that tube No. 1 was perfect, but tube No. 2 (the one reported by Captain Lee) did not compensate for change of temperature as delicately as it should, and required a new abutting piece on the compensating lever, which Mr. Wurdemann constructed and adjusted, reducing the error, previously noted, to an inappreciable amount.

At the same time Mr. Wurdemann thoroughly examined both tubes and all other parts of the apparatus, cleaning and adjusting them. Finally, a series of comparisons were made with both tubes and the standard bar, so that the apparatus stands on the ground in complete order and ready for immediate use. I cannot omit expressing here my sense of the valuable services rendered by Mr. Wurdemann on this occasion, not only in the adjustment of the base apparatus, a beautiful specimen of his mechanical skill and ingenuity, but also in the adjustment and repairs of numerous other instruments that were placed in his hands.

#### ASTRONOMICAL OBSERVATORY.

This duty was assigned to Second Lieutenant C. N. Turnbull, topographical engineers, assisted by James Carr.

The instruments belonging to the survey, consisting of a transit 32 inches focal length, of English construction, but without a name on it, and a Würdemann zenith telescope of 24 inches, were, as previously stated, set up in the spring at Detroit, that Lieutenant Turnbull and his assistants might become familiar with the manipulation of the instruments, and with the observations and formula required in their adjustments and use.

Early in June Lieutenant Turnbull and party were carried to Sand Point, and have been constantly occupied since in making the requisite observations for the latitude and longitude of the observatory.

Much embarrassment has been experienced by Lieutenant Turnbull from the faulty construction of the transit instrument. He has found it impossible, from this cause, to obtain permanent adjustments, and has in consequence been compelled to multiply beyond a degree otherwise necessary his observations to obtain the errors of the instrument and of position.



Notwithstanding this obstacle, by perseverance and close attention to duty Lieutenant Turnbull has already produced results that will compare favorably with other field observations. In the appendix (No. 3) is a statement of the season's work to date, by which it will be seen that 21 transits of the moon and moon culminating stars have been observed for longitude, and 265 pairs of stars with the zenith instrument for latitude.

This list will be increased by the close of the season, and the resulting latitude and longitude determined with as much accuracy as the character of the instruments and field observations will admit.

The bureau having approved of the requisition for a new transit instrument and an electro-chronograph, it is expected these instruments will be received by the close of the season for field work, when the Detroit observatory will be reoccupied, and an effort made to obtain its longitude by telegraph from the observatory at Cambridge, Massachusetts.

It is also proposed to make a telegraphic connexion with the observatory of the University of Michigan, at Ann Arbor, and that the next season, corresponding observations on the moon and moon culminating stars being made there and in the field, the errors of this method of determining longitude will be proportionally reduced by the diminished space between the observers.

#### TOPOGRAPHY AND HYDROGRAPHY OF SHORE LINE.

The first party placed in the field was that under the charge of W. H. Hearding, assisted by Messrs. J. C. Forster, J. Beghien, and O. N. Chaffee.

This party landed at Willow creek, near Point aux Barques light-house, and, commencing about a mile below the light-house, were instructed to carry the delineation of the shore and the hydrography to the four fathom curve, until a junction was effected with last season's work at Oak Point.

This duty was successfully accomplished by the 15th instant, and the party transferred to the south shore.

The amount of work thus far executed by Assistant Hearding is shown in the appendix, (No. 4,) and in general terms amounts to over fifty square of topography and minute hydrography.

A portion of this, from the commencement to Point aux Barques, was over a very exposed coast, which, being reported weekly, required minute examination.

Though Assistant Hearding did not find the coast as bad as represented, yet he found several shoals of rocks, and one at Point aux Barques, extending one and two-thirds miles from the shore. The town of Port Austin was also in this section of the work, which Assistant Hearding was instructed to survey minutely.

Soon after taking the field Assistant Hearding's party was weakened by the resignation of his principal assistant, Mr. J. E. Forster. The long connexion of this gentleman with the survey, and the very efficient service always rendered by him, makes it proper that I should



here express the regret which, in common with all on the survey, I felt at his separation from the work.

The second topographical party placed in the field was the one under the charge of G. W. Lamson, esq., assisted by D. F. Henry and A. Lamson.

Assistant Lamson resumed his work, where he had discontinued last season, on the northwest coast of the bay, about four miles from the village of Towas. He was instructed to continue the delineation of the shore, till a connexion at the Opinone Kawling river was made with Assistant Hearing's work of last season, and to carry out his soundings to four fathoms, and connecting with the hydrography from the Charity islands executed last season by Assistant D. F. Henry.

At the present date Assistant Lamson has succeeded in executing over 70 square miles of hydrography and topography, and has completed nearly four-fifths of the work assigned to him; since the 1st instant Assistant Lamson has been detached to execute some duty at Mackinaw and on the St. Mary's river, the charge of the party during his absence devolving on Assistant D. F. Henry. It is due to the gentlemen of this party, to state that their work has been very energetically and successfully executed. A summary of the season's work will be found in the appendix marked No. 5.

The third topographical party under the charge of 2d Lieutenant O. M. Poe, topographical engineers, assisted by H. C. Penny and J. E. Goodell, were placed on one of the Sibonin islands, east shore Saginaw bay, and commencing at Sand Point, Lieutenant Poe was directed, to carry his work towards the south till he connected, near the mouth of Saginaw river, with Assistant Hearing's work of last season; Lieutenant Poe was required to survey carefully "Wild Fowl bay," an extensive sheet of water between the Sibonin islands and the main shore; at the same time he was directed to carry out the hydrography outside of the islands as far as practicable, connecting in the direction of the Charity islands with the last season's work. Up to the date of his transfer to the triangulation party, (August 17,) Lieutenant Poe had completed about 55 square miles of topography and hydrography. Upon his separation from the party, the charge devolved upon Assistant H. C. Penny; to whom was assigned Assistant H. Gillman, till then occupied in the office at Detroit reducing maps.

Assistant Penny has prosecuted the work with great vigor, and has succeeded to the present date in excavating 45 square miles of topography and hydrography. The details of the work executed by this party, while under the command of Lieutenant Poe and Assistant Penny will be found in the appendix marked Nos. 6 and 7.

Assistant Hearing, whose transfer from the northeast side of the bay is mentioned above, was, on the 15th instant, placed on the south shore near the Saginaw river, with directions to resume the work where he left off last season, and work to the eastward to connect with Assistant Penny. There is no doubt these parties will soon meet, and there is, therefore, every reason to believe that by the close of the season the whole of the topography and hydrography of the *shore line* of Saginaw bay will be completed.

The orders of the bureau requiring me to mark the boundaries of the public lands on the island of Mackinaw, Assistant G. M. Lamson was detached from the survey of Saginaw bay early in September, and ordered to execute this duty. Assistant Lamson was selected in consequence of his having made in 1855, the survey upon which the orders of the bureau were predicated.

My attention having been called by Captain A. W. Whipple, topographical engineers, in charge of the improvement of Lake George, St. Mary's river, to certain changes that had taken place since the survey of that lake, or rather to the omission of our survey to clearly indicate a channel in the lake which Captain Whipple was satisfied existed, I directed Assistant Lamson to make such examinations as would enable me to supply any deficiency in the previous survey of Lake George. His attention was also directed to endeavoring to ascertain the practicability of getting the large triangle projected by Captain Macomb, for the rectification and correction of the survey of the St. Mary's river.

It is also proposed, on the termination of the field work in Saginaw bay, should the character of the season justify it, to transfer one or more of the parties to Maumee bay, in Lake Erie, in order to revise the survey of that bay, made in 1844, and extend it to the town of Toledo. This will enable the issue of a new chart of this important bay, which has become necessary from reported changes in the channel ways, and the difficulty of solving certain questions in connexion with light-house improvements.

It will be seen from the above that, at the close of the present season of field work, it is expected that the base line will be measured; the main triangulation extended from it to cover all of the bay above the Charity islands; that the latitude and longitude of one of the points of triangulation will be accurately determined by observation, and the azimuths of one or more of the lines of triangulation; that the topography and hydrography of the whole of the shore line of the bay, both above and below the Charity islands, will be completed; finally, the hydrography of the bay above these islands, not included in the shore line work, will be completed; in other words, the data obtained for the final projection of the chart of this extensive and important bay above the islands, comprising a space of over 900 square miles of work executed.

*Drawing and reduction of charts, engraving, &c.*

The monthly reports from the office of the survey have advised the bureau of the progress of the work in this department; it will, therefore, only be necessary to briefly recapitulate what has been done to date.

At the date of the last annual report Assistant J. Mueller was engaged on the reduction of the chart of the Beaver islands and north shore of Lake Michigan.

This chart was completed and forwarded to the bureau to be engraved on the 1st of last April, and it is expected that it will be ready for distribution in a short time. The preliminary charts of the St.

Clair flats, scale  $\frac{1}{10000}$ , was transmitted to the bureau in December last. It was then reduced one-half, has been engraved, and is now ready for distribution to navigators. The preliminary chart of "the mouth of the Saginaw river," scale  $\frac{1}{10000}$ , drawn by Assistant Harding and party, was also forwarded to the bureau to be engraved early in May last, and in the same month the preliminary chart of the harbor of Towas, scale  $\frac{1}{10000}$ , drawn by Assistant Lamson and party, was likewise sent to be engraved. It is expected both these charts will be distributed before the close of the season of navigation. The preliminary chart of Eagle harbor, Lake Superior, scale  $\frac{1}{5000}$ , reduced and drawn principally by Second Lieutenant Poe, topographical engineers, and subsequently, on that officer taking the field, completed by Assistant Gillman, was sent to Washington to be engraved, in July last.

Since the completion of the Beaver Island chart, Assistant J. Mueller has been engaged on the first sheet of the preliminary chart of the St. Mary's river, which it is proposed to publish in three sheets, on a scale of  $\frac{1}{10000}$ . Assistant Gillman has commenced the reduction for the engraver of the preliminary chart of Agate harbor, Lake Superior, and had made good progress on the same when the exigencies of the service required his being sent to the field.

It will thus be seen that during the past year *five* charts (one final and four preliminary) have been transmitted to the engraver, and that considerable progress has been made in the preparation of two additional charts.

I take this occasion to renew the recommendation made in the last annual report, that additional means be asked, to increase the force in the department of the survey. There are at present in the office the data for the charts of the river St. Mary's and three harbors in Lake Superior, and long before they can be prepared for engraving the data will be obtained for the chart of Saginaw bay. The data is thus constantly accumulating, and a delay in the publication of the results of the survey necessarily occurs for want of appropriate means to prepare them. I also deem it proper, for reasons set forth in the last annual report, to renew the recommendation that the engraving of the charts be placed under the direction of the officer in charge of the survey, the same as the other departments of the work, and subject to the same control and supervision as is now exercised in those other departments.

It may be deemed of interest to present here a list of the charts published by the survey to date, together with those at present either in course of publication or preparation therefor.

List of charts published to October 1, 1857:

One chart of Lake Erie.

One chart of west end of Lake Erie.

One chart of Keeley's and Bass islands, Lake Erie.

One chart of head of Green bay.

One chart of East Neebish rapids, St. Mary's river.

One chart of the Straits of Mackinaw.

One chart of St. Clair flats, (preliminary.)

One chart of Saginaw river, (mouth and bar,) ditto.

Charts now being engraved :

One chart of Beaver island and north shore of Lake Michigan.

One chart of the harbor of Towas, (preliminary.)

One chart of Eagle harbor, Lake Superior.

Charts nearly ready and being prepared for engraving :

Three charts, each a portion of river St. Mary's.

One chart of Agate harbor, Lake Superior.

One chart of Eagle River harbor, Lake Superior.

One chart of Ontonagon harbor, Lake Superior.

*Estimate of funds and plan of future operations.*

In preparing the estimate which is herewith annexed to this report, I have been governed by the expenditures incidental to the survey on its present basis of organization. The estimate, of course, should be based on the plan of operations to be carried on next season, as it might be materially modified by the particular locality selected for survey. In the absence, however, of the orders of the bureau upon this point, I have deemed it proper to present an estimate for a complete and efficient organization with the force and equipment now on hand, and so adjusted in its several details that it will be in the power of the bureau to select any of the numerous points of our important field, and the force can be concentrated thereon.

At the same time, that it may be in the power of those having the authority to appropriate to extend the operations of the survey, I have added to the estimate additional items, showing the several amounts that would be required to carry on the survey simultaneously in two or more lakes. The organization that is estimated for is the minimum that can be employed with efficiency. To carry on the survey on any part of the lakes, upon the system alone consistent with any degree of scientific accuracy, will require separate parties for the triangulation, astronomy, hydrography, and topography. These are all that are estimated for. Many years' experience of the expenses incidental to these parties, together with the general results of the survey, enable accurate and just estimates to be made of the amount required. It would seem, therefore, only reasonable to expect the estimate would be adopted in the appropriation, and not be cut down to simple round numbers, as has heretofore been the practice.

To separate the parties above referred to, or divide the appropriation into two or more surveys, would be simply to delay the production of results in direct proportion to the distribution made.

For instance, the concentration of the force in Saginaw bay has enabled the survey of this bay to be made, or nearly made, in two seasons. Now, if, instead of this concentration, one-half the force only had been thus employed, and the other half sent, say to the north end of Lake Michigan, the result would have been that it would have required four seasons, or two years, to complete Saginaw bay, and the same length of time to accomplish an equal amount of work in Lake Michigan; the expenses of both surveys being increased by the increased wear and tear of equipment, and the increased num-

ber of times fitting out for the field. Hence it is that I deem it my duty to urge the concentration of the present force on one lake, or at one locality, when, having completed the survey there, a transfer can be made to another part of the field. The estimate for this plan is \$71,625. It is earnestly hoped this amount will be granted, as, the bureau may be assured, any reduction of the estimate will only result in prolonging the work.

The second item in the estimate, amounting to \$2,750, is for simultaneous meteorological and water level observations to be made over the whole lake region.

The question of the fluctuations of the water level of the lakes, their maxima and minima, and the time required to reach these points; the laws governing them, and the causes producing them, are subjects of the highest scientific interest, and of direct bearing upon the results of the lake survey. It is, therefore, in my judgment, a legitimate subject of inquiry, to be prosecuted under the direction of the survey, and which would, without doubt, before this, have received more attention, but for the want of means.

These changes in the water level seem to be of three kinds: 1st, a gradual rise and fall, spreading over a series of years; 2dly, the temporary changes, due to storms and prevailing winds; 3dly, sudden and temporary changes, attributed by some to sub-aqueous action, by others to changes in the pressure of the atmosphere, and various other causes.

In some parts of the lake region it is asserted there is a tide perceptible, in other parts the changes are said to be periodical and quite uniform. The only mode in which this problem, and the various questions incident thereto, can be fully solved, is by simultaneous observations for a series of years, extending over the whole lake region, and to be accompanied by meteorological observations. With the data thus produced, a discussion can be understandingly entered upon, and if these phenomena are subject to any fixed and regular laws, these laws will be deduced. Should the appropriation now asked for be granted, I will endeavor, by the selection of suitable points and trustworthy agents, to obtain the necessary data.

The third, fourth, and fifth items of the estimate, each amounting to \$52,500, are submitted with a view of extending the survey over two or more, or all the lakes, at the same time. At present there are points of extreme interest to navigators yet unsurveyed in Lakes Huron, Michigan, and Ontario, while that magnificent inland sea, Lake Superior, is almost unknown.

Should the most liberal appropriations be made, it will necessarily be the work of years before this vast region can be accurately surveyed; and as this survey is a question of time, dependent on means, it can readily be calculated what time will be required to complete the work at the present rate of appropriations. The annual reports from this office for many years past have urged increased appropriations, and it would seem almost a useless task to again ask for them. Nevertheless, in the hope of arousing the attention of those interested, I deem it my duty again to submit some of the more prominent reasons for urging the making of more liberal appropriations. The survey of the lakes has for its object the delineations of the shores and bottom

of the great northern and northwestern lakes ; the bringing to light all hidden dangers to navigation ; the furnishing the evidence of the capacity and depth of water in all the harbors and rivers, and consequently the most practicable mode of improving them ; the furnishing the evidence of the wants of navigation in reference to light-houses, beacons, and buoys, and the proper sites for the same. This cursory glance at the objects of the survey sets forth the field of usefulness that is covered by it, and the numerous and extensive interests it embraces.

There is the direct interest of the national government, or of the whole people of the United States. The delineation of the shores of the lake region is simply a correct representation of our most extensive inland frontier contiguous to the most powerful neighbor we have, now a friend, but who may assume another character. In case of a war with Great Britain, it is impossible to estimate the value of a correct survey of the lakes. At the present time there are numerous harbors that, with a few guns in position, would afford shelter to our commerce or fleets, if outnumbered, that are absolutely unknown even to the great mass of navigators. One of these, the harbor of Wild Fowl bay, will be made known by the present season's work ; others have been brought to light, and will be as the work progresses. Should the government desire to improve or fortify any harbor on the lakes, the charts and notes of the survey ought to afford all requisite data. These charts should also show where light-houses are necessary, and the most eligible sites for them.

But, independent of national interests, as above alluded to, there are the interests of commerce and navigation, which, from the extent of country covered by these lakes, and the variety of products that find a market through them, may almost be said to be national. It is unfortunately not in my power to furnish correct statistics of the commerce and navigation of the lakes. It is well known they are immense, and yearly increasing ; nor do I think it can be necessary to demonstrate the direct practical bearing of correct surveys on the interests of commerce and navigation. No one, I should think, could be found to deny it. The difficulty appears to be to draw the attention of those interested to the existence of the survey, and the fact that it does not produce the results it might for want of proper means. If those representatives in Congress whose constituents are directly interested in every measure tending to encourage the trade and navigation of the lakes could only have their attention drawn to the fact that this is one of the results of the lake survey, so vast is this interest and so great in its geographical extent, that I am quite satisfied a majority of Congress would be found on the side of the most liberal appropriations. Believing this to be the case, and, furthermore, that the larger the appropriations the more rapid the production of results, I have thought myself called upon to state my views, as given above, with the hope that, through my humble instrumentality, this really great work might be furnished with means commensurate with its importance.

Very respectfully, your obedient servant,

GEO. G. MEADE,

*Captain Topographical Engineers.*

Col. J. J. ABERT,

*Corps Topographical Engineers, Washington, D. C.*



## APPENDIX No. 1.

*Amount of work done by the party on board the steamer "Search" during the season of 1857.*

- 6 main triangulation stations, 45 feet (or over) length of instrument.
- 3 main triangulation stations, 30 feet (or over) length of instrument.
- 3 hydrographical parties brought from Detroit and put in position.
- 2 parties moved, with stores and camp equipage.
- 3 miles of sight, 40 feet wide, opened through timber.
- 4 stations occupied.
- 13 angles measured with theodolite.
- 247 sextant angles.
- 329 miles of lines sounded.
- 3,000 miles run on duty, independent of soundings.

## APPENDIX No. 2.

*Amount of work done by the triangulation party under Second Lieutenant O. M. Poe, topographical engineers.*

- 6 stations occupied.
- 54 angles measured.
- 3,886 pointings of theodolite.
- 317 readings of limb.

## APPENDIX No. 3.

*Amount of work done by the astronomical party under Second Lieutenant C. N. Turnbull, topographical engineers.*

- 355 stars observed for time and errors of instrument.
- 265 pairs of stars observed for latitude.
- 21 observations on moon and moon culminating stars for longitude.
- 76 observations on circumpolar stars for value of micrometer.
- 4 miles of levels run over base line.
- 13,900 feet of base line prepared.
- Tide gauge observed, length of water, state of barometer noted, &c.

## APPENDIX No. 3.

*Amount of work executed by the topographical and hydrographical party under Assistant W. H. Harding.*

- 11 meridian and light stations built.
- 94 sounding stations.
- 139 buoys put out and located.



- 31 miles shore line run.
- 2,107 pointings of theodolite.
- 50 sextant angles.
- 4 bench marks established.
- 5 observations for true meridian.
- 31,462 casts of the lead.
- 1,064 lines of sounding.
- 886 miles of sounding.
- 70 compass readings.
- 50½ square miles minute hydrography.

APPENDIX No. 3.

*Amount of work executed by the topographical and hydrographical party under Assistant G. W. Lamson.*

- 24,752 casts of the lead.
- 667 lines of sounding run.
- 637½ miles of sounding.
- 70½ square miles of hydrography.
- 198 buoys put out and located.
- 630 sextant angles.
- 31½ miles shore line run.
- 12½ miles of sight opened.
- 1,816 readings of theodolite.
- 55 square miles topography.
- 67 sounding stations built.
- 2 triangulation stations built.
- 51 compass readings.
- 4 observations on Polaris for new meridian.

APPENDIX No. 6.

*Amount of work executed by the topographical and hydrographical party under Second Lieut. Poe, topographical engineers, previous to the 17th August.*

- 55 square miles topography and hydrography.
- 35 miles shore line.
- 451 lines sounded.
- 550 miles of lines sounded.
- 34,957 casts of the lead.
- 1,495 readings of theodolite.
- 129 sextant angles.
- 59 buoys put out and located.

APPENDIX No. 7.

*Amount of work executed by the hydrographical and topographical party, under the charge of Assistant Henry O. Penny, since the 17th August.*

- 28,217 casts of the lead.
- 337 lines of sounding.

- 3,906 miles of lines sounded.
- 53 buoys placed out and located.
- 192 sextant angles.
- 45 square miles of hydrography and topography.
- 10 miles of shore-line traced.
- 13½ miles of marsh staked out.
- 19,794 feet chained.
- 6 sounding stations built.
- 5 observations for true meridian.
- 8 compass readings.
- 11 triangulation stations occupied.
- 1,023 pointings of theodolite.
- 1,626 readings of theodolite.
- 40 angles measured.

#### ANNUAL ESTIMATE.—LAKE SURVEY.

*Estimate for continuing the surveys on Lake Huron on the present scale of operations.*

For steamer Search, to be employed in off-shore hydrography and the general purposes of the survey, it will require:

1 assistant, at \$4 per day, 183 days.....	\$732 00
1 assistant, at \$2 50 per day, 183 days.....	457 50
1 sailing-master, at \$2 50 per day, 183 days.....	457 50
1 mate, at \$1 75 per day, 183 days.....	320 25
1 engineer, at \$2 25 per day, 183 days.....	411 75
1 assistant engineer, at \$1 50 per day, 183 days.....	274 50
1 carpenter, at \$1 50 per day, 183 days.....	274 50
1 steward, at \$1 25 per day, 183 days.....	228 75
1 cook, at \$1 25 per day, 183 days.....	228 75
1 cook, at 80 cents per day, 183 days.....	146 40
4 firemen, at \$1 each, 183 days.....	732 00
14 seamen, at 70 cents per day, 183 days....	1,783 40
Subsistence for 28 men, at 50 cents each per day.....	2,562 00
600 tons coal, at \$6 per ton.....	3,600 00

Amount for steamer Search..... \$12,209 30

For triangulation party on board the steamer Surveyor, it will require:

1 assistant, at \$2 per day, 183 days.....	366 00
1 sailing master, at \$2 per day, 183 days....	366 00
1 mate, at \$1 50 per day, 183 days.....	274 50
1 engineer, at \$2 per day, 183 days.....	366 00
3 firemen, at \$1 per day, 183 days.....	549 00

1 cook, at \$1 per day, 183 days.....	\$183 00
1 steward, at 80 cents per day, 183 days.....	146 40
5 seamen, at 70 cents per day, 183 days.....	640 50
300 tons coal, at \$6 per ton.....	1,800 00

Amount for steamer Surveyor..... \$4,691 40

For topographical party for one month  
(30 days):

1 assistant, at \$4 per day, 30 days.....	120 00
1 assistant, at \$3 per day, 30 days.....	90 00
1 assistant, at \$2 per day, 30 days.....	60 00
1 foreman, at \$1 50 per day, 30 days.....	45 00
1 steward, at \$1 per day, 30 days.....	30 00
1 cook, at \$1 per day, 30 days.....	30 00
2 leadsmen, at 90 cents per day, 30 days....	54 00
2 chainmen, at 80 cents per day, 30 days....	48 00
14 boatmen, at 70 cents per day, 30 days....	294 00
Subsistence 24 men, at 50 cents per day.....	360 00
Transportation of party and supplies.....	500 00

Total, one party one month ..... 1,631 00

Three parties six months in the field..... 29,358 00

For astronomical and magnetic party:

1 assistant, at \$3 50 per day, 183 days.....	640 50
1 assistant, at \$1 50 per day, 183 days.....	274 50
1 cook, at \$1 per day, 183 days.....	183 00
7 men (one boat's crew) at 70 cents per day, 183 days .....	896 00
Subsistence 10 men, 50 cents each per day, 183 days.....	915 00
Transportation, camp equipage, &c.....	500 00

Total for six months..... 3,409 00

MISCELLANEOUS ITEMS.

Office rent and fuel.....	1,200 00
Rent of wharf and warehouse.....	500 00
Pay of computer and draughtsman.....	1,460 00
Allowances to four officers T. E., fuel, quar- ters, and transportation.....	1,500 00
Four assistants in office, at \$4 per day.....	2,926 00
Three assistants in office, at \$3 per day.....	1,638 00
Three assistants in office, at \$2 50 per day..	1,372 50
Steamers in ordinary.....	4,500 00
Stationery, drawing paper, &c., &c.....	350 00

15,446 50

## CONTINGENCIES.

For current expenses, such as repairs of steamers, boats, tents, purchase of cordage, blocks, rigging, tools, paints, oils, &c., &c., &c.

10 per cent. on the above amounts..... \$6,511 42

Total amount required to carry on the survey on the existing organization..... 71,625 72

For meteorological and water level observations, to be made simultaneously on the whole lake region, will require at each station :

One barometer, \$15 ; one thermometer and rain gauge, \$5 ; one water gauge, \$5 ; pay of observers, five months, \$50 ; total for each station, \$75 ; 20 stations	1,500 00
For pay of agent setting up gauges and instructing observers.....	1,000 00
To continue and extend the surveys, on existing organization, on Lake Superior.....	50,000 00
For additional instruments for ditto.....	2,500 00
To continue and extend the surveys, on existing organization, on Lake Michigan.....	50,000 00
For additional instruments for ditto.....	2,500 00
To continue and extend the surveys, on existing organization, on Lake Ontario.....	50,000 00
For additional instruments for ditto.....	2,500 00
	<hr/>
	231,625 62

Respectfully submitted.

GEO. G. MEADE,  
*Captain Top. Engineers.*

OFFICE SURVEY N. AND N. W. LAKES,  
*Detroit, November 23, 1857.*

SIR : The early period (September 15th) at which I had to make the annual report of the survey of the northern and northwestern lakes, and the amount of work which has been subsequently executed, induce me to submit to you a "supplementary report," containing the results of the operations in the field from the date above mentioned to the present day.

In doing this, I shall adhere, for the sake of direct comparison, to the same division of subjects as was made in the annual report :

*Off-shore hydrography and main triangulation.*

The off-shore hydrography, or that which is not included in the work of the parties employed in delineating the shore-line, was being executed, as you were advised by the annual report, by the party on

board the steamer *Search*, under my immediate direction. At the date of that report considerable progress had been made in the sounding of Saginaw bay, above the Charity islands. This work was completed by the close of the month of September, at which time, in addition to the amount of work reported (in Appendix No. 1 Annual Report,) there had been executed 360 miles of lines sounded and 210 sextant angles observed. To illustrate more fully the character of the season's operations, I herewith enclose a sketch of Saginaw bay, on a scale of  $\frac{1}{180000}$ , on which the off-shore hydrography of the whole season is shown by the sheet marked v000, amounting to 450 square miles in all.

This hydrography has been executed with a minuteness of detail that will enable us to show the exact character of the bottom of this large estuary.

### *Main Triangulation.*

Second Lieutenant Poe, in charge of this duty, was assiduously occupied therein till the 28th day of October, by which time he was able to accomplish the work proposed to be executed this season, to wit: the triangulation of that portion of Saginaw bay above the Charity islands.

In addition to the amount of work reported by that officer, to include the 15th September, he now reports:

17 stations occupied.

1,281 pointings of the telescope.

410 readings.

170 angles measured.

The full lines on the accompanying sketch show the lines from the occupied stations, and the broken lines represent the work yet to be executed below the Charity islands, to complete the data for the chart of Saginaw bay.

### *Measurement of the Base Line.*

At the date of the annual report the ground on which it was proposed to measure the base was being prepared by grading and otherwise for this operation.

By the 9th of October, the ground being prepared, the measurement was commenced by the party under my immediate charge, assisted by the party under the charge of Lieutenant Turnbull, topographical engineers, who had by that date completed his astronomical observations.

It is not deemed necessary to give here a description of the very ingenious and elegant apparatus belonging to the survey used on this occasion, as the same has been accurately described by Captain T. J. Lee, topographical engineers, in his report on the measurement of the Mackinac base, published in the annual report of the bureau of topographical engineers for 1854.—(See House Ex. Doc. for 1854.)

Captain Lee, in that report, states that, on testing the apparatus in the field before measuring the line, a slight want of compensation was detected in one of the measuring tubes. As the value of the apparatus was directly dependent on accuracy in this particular, I obtained the authority of the bureau, and sent for the maker, Mr. Wm. Würdemann, of Washington ty, to test, and, if necessary, correct any error detected.

Mr. Würdemann, as stated in the annual report, was employed at Sand Point, in June, in making the necessary comparisons, which resulted in confirming the report of Captain Lee, and required a readjustment of the lengths of the arms of the compensating lever in tube No. 2, the one found out of order. Mr. Würdemann then communicated a singular circumstance, which I deem worthy of here recording. He stated that when he constructed the apparatus for the coast survey, at the suggestion and under the direction of Professor A. D. Bache, he adopted for the determination of the lengths of the arms of his compensating lever the ratio of the relative expansion of brass and iron, as given by the authorities of most weight, but found on testing his apparatus that it did not properly compensate. He then instituted a series of numerous experiments, and deduced from them the required ratio, which proved in the result to be correct.

When, however, he constructed the apparatus for the lake survey, he found the ratio he had previously deduced would not answer—a difference which he attributed to the fact that the brass bars of the lake survey apparatus had been in their manufacture drawn like wire, and not hammered; he therefore determined for tube No. 1 the actual expansion of the bar to be used, as he had previously done for the coast survey apparatus. As, however, the brass bars for the lake survey apparatus had been all made of the same material, in the same manner, and at the same time, and as he was somewhat pressed for time in making our apparatus, he considered he was justified in taking for tube No. 2 the ratio he had actually determined for tube No. 1. The failure of tube No. 2 to be perfectly self-compensating, proved that it was necessary to determine the *actual ratio* for each bar that was to be used, and that brass bars made of the same material and under identically similar circumstances, with equal dimensions, had different linear expansion for changes of temperature.

As previously stated, Mr. Würdemann adjusted the lever of compensation of tube No. 2 by successive experiments, until it was found to be perfectly self-compensating. At the same time he cleaned and adjusted both tubes and all parts of the apparatus.

The first operation in the measurement was to obtain the exact length of the tubes, by making repeated comparisons between each tube and the standard bar belonging to the apparatus, the length of which, at 62° Fahrenheit, had been established at Washington. Having carefully made these comparisons, the apparatus was transported to the west end of the line, and the measurement commenced on the 10th of October.

From this date it was continued till the 28th of October, with an intermission of three and a half days, from weather and necessary absence on my part, attending to the general duties of the survey.

In the measurement I took charge of the sector end of the tube, being relieved at times by Lieutenant Turnbull. Lieutenant Turnbull had charge of the other end of the tube, overseeing the setting of the foot plates.

The transit to regulate the alignment was placed under the charge of Assistant J. A. Potter, occasionally relieved by Assistant J. Carr, and, during the latter part of the measurement, (Assistant Potter being detached,) was entirely under Assistant Carr. The record was

kept by Assistant Wm. Casgrain. It is due to all these gentlemen to state that the service was performed in the most satisfactory manner, and to each and all my thanks are due for the commendable zeal and energy displayed by them.

It has been previously reported that triangulation stations had been erected at the termini of the proposed base. The measurement accordingly began 100 yards to the east of the western terminus. This point was marked by a limestone post sunk to the depth of three feet, and rising some six inches above the ground. The top of this post, 10 inches square, has cut in it two lines at right angles, one of which is in the general direction of the base, and the intersection is the point of beginning. To further identify this point, two reference stone posts were sunk level with the ground and at right angles to the measured line, the northern one being distant  $70\frac{75}{100}$  feet, and the southern one  $73\frac{7}{10}$  feet. These posts have on them lines cut, the intersection of which are the points of the perpendicular to the base at the distances above mentioned.

From the point of beginning an offset was measured to the north-west, at an angle of  $60^\circ$ , and 22 tubes measured, being about the distance of the point of beginning from the station at end of base.

The termination of this offset was marked likewise by a stone. It will be as well to remark here that the eastern end of the measured line was marked in a similar manner. The reference stones there being distant, the northern one 37.55 feet, and the southern 25.45 feet, the termination of this offset of 24 tubes was also marked by setting a stone in the ground, the offset here being to the southeast. Careful measurements, with numerous repetitions, were made of the angles of the two triangles connecting these offsets with the trigonometrical stations at each end of the base proper. In addition to the stones above described as left in the ground, there were two intermediate stones left on the measured line at the distances, respectively, of 330 and 693 tubes from point of beginning. All these stones were carefully placed in position by transferring the agate point of the tube to the stone by means of the transit on the line, and a theodolite placed at right angles, according to the method described by Captain Lee in the report above referred to.

The measurement was continued from the 10th to the 27th of October, with the intermission above mentioned of three and a half days.

It has already been stated that the line passed over a series of gentle rolling sand-hills or dunes, formed by the action of the wind and sea in former times, and covered with a growth of pine and hard wood; that the line had been opened for a space of 40 feet, and all roots removed for a space of 20 feet and graded, after being ploughed for a space of 8 feet. No better ground could be found for the use of the measuring tubes, as the sand afforded a most solid and firm bed for the foot plates, and rendering the tubes proportionately stable. Great facility in the measurement was in consequence attained, and, had it been begun with the possession of the experience acquired during its progress, the time occupied would have been very much shorter.

The following table will show the degree of progress and the amount of work each day:



Table showing the progress of each day's work.

Date.	Hours at work.	TUBES MEASURED EACH DAY.			GRADE EACH DAY.		Average time per tube.	Mean each day of thermometer in tube.	Weather.
		Inclined.	Level.	Whole No.	Max.	Average.			
	A. M.				° ' "	° ' "	m. s.		
Oct. 10	5 25	6	21	27	2 16 0	0 17 26	12 22	69°.70	Calm and clear.
11	6 20	14	45	59	3 2 30	17 20	6 26	71°.75	NE. light breeze, cloudy.
12	4 25	11	33	44	1 24 0	8 1	6 1	63°.45	SW. fresh breeze, cloudy.
15	9 15	13	66	79	2 0 0	5 34	7 1	61°.72	Calm and clear.
16	9 35	33	79	112	1 59 20	14 10	5 8	52°.00	N. light breeze, cloudy.
17	8 15	40	64	104	3 0 0	31 49	4 45	51°.04	SW. fresh breeze, cloudy.
18	8 26	35	79	114	2 31 40	19 29	4 25	45°.90	SE. light breeze, cloudy.
19	8 20	63	53	116	2 38 0	28 27	4 18	43°.05	WNW. fresh breeze, cloudy.
20	8 35	95	43	138	3 48 10	48 53	3 44	35°.66	WNW. fresh breeze, cloudy.
21	7 15	67	40	107	2 59 0	39 35	4 4	52°.00	Calm and clear.
22	8 55	43	83	126	1 26 30	13 26	4 14	45°.00	Calm and clear.
23	4 45	15	51	66	2 0 15	7 57	4 19	45°.20	Calm and cloudy.
24	9 00	44	97	141	2 24 40	1 1 22	3 49	46°.85	S. light breeze, cloudy.
25	8 15	20	103	123	1 35 0	36 14	4 0	48°.95	N. fresh breeze, cloudy.
26	2 25	1	39	40	54 0	54 0	3 37	44°.48	N. fresh breeze, cloudy.
27	3 55	9	55	64	1 59 30	58 33	3 40	41°.26	NE. light breeze, cloudy.
In all 16 days.	113 06	509	951	1,460	-----	28 53	4 38		

It will be seen from the above that the greatest number of tubes measured in one day was 141, or a distance of four-tenths of a mile; that an average day of nine hours would give an average progress of 117 tubes, (1,755 feet,) one-third of a mile; that, of the whole number of tubes, 1,460, a little over one-third, or 509, were inclined; of these the maximum grade was  $3^{\circ} 48' 10''$ , and the average grade about  $29'$ ; that the average length of time occupied in measuring a single tube was, on the first day, 12 minutes 22 seconds; and on the last day, 3 minutes and 40 seconds; and for the whole measurement, 4 minutes and 38 seconds. This difference between the commencement and termination was due to the experience acquired as the measurement progressed in the manipulation and adjustments of the tubes.

The average thermometer in the tube was  $51^{\circ}.12$  Fahr., the maximum mean for a day being  $71^{\circ}.75$ , the minimum  $35^{\circ}.66$ .

In order to test the measurement, the last day's work of 40 tubes, together with one of the offsets, were remeasured, and, to enable the making of a direct comparison, the same grades with each tube were preserved. I am gratified to be able to report that no appreciable difference was perceptible in the points on the stone on transferring the agate of the tube at the end of the measurement.

The measurement terminated on the 27th of October, and on the 28th the final comparisons of the tubes with the standard bar were made, to determine their lengths. The reductions for these have been made, and a slight change observed from the same quantities as given on the 9th October before the measurement.

	<i>Inches.</i>	<i>Inches.</i>
Comparisons of October 9th make		
tube No. 1.....	179.996646	No. 2, 179.999984
Comparisons of October 28th make		
tube No. 1.....	179.998971	No. 2, 180.005483
Mean length.....	<u>179.9978085</u>	<u>180.0027335</u>

The adjustment of the index of the sector level was carefully examined and tested, by means of a spirit level, both before, during, and after the measurement, without detecting any index error. The reductions for the inclined tubes will, therefore, in all cases, be subtractive. These reductions are now being carefully made by two computers, which, when completed, will enable the correct length of the base to be immediately obtained.

A series of daily observations with the barometer for a period of four months at the observatory at Sand Point will afford the data for obtaining the approximate elevation of the base above the sea level and its reduction thereto.

*Astronomical and magnetic observations.*

Lieut. C. N. Turnbull, in charge of this department, reports that subsequently to the 15th September seven transits of the moon and

moon culminating stars have been observed, in addition to those heretofore reported, making for the whole season twenty-seven transits of the moon and stars to determine the longitude of the observatory. After completing the observations, the post on which the transit stood was connected with the west end of the base by a series of very favorable triangles, the angles of which were carefully observed by Second Lieutenant Poe.

Lieutenant Turnbull likewise reports having completed his series of observations for the determination of the dip and variation of the needle.

Lieutenant Turnbull had also established at the Sand Point observatory a gauge for recording the variations of the water level of the lake, which was observed at stated periods every day. These observations were connected with permanent marks on shore, to which the observations of last year were referred; thus affording data for determining the relative level of the surface of the water at these two periods.

All these observations, astronomical and others, are now being computed and reduced by two or more computers, and the results, when obtained, will be duly transmitted to the bureau.

### *Topography and hydrography of shore line.*

At the date of the annual report the shore line of Saginaw bay had been so far completed that it justified the expression of the belief that, by the close of the season, it would be fully so—a prediction that I am glad to be able to report has been confirmed.

Assistant W. H. Hearing's party were transferred about the 15th of September to the south shore of the bay, near the mouth of the river. At this point Assistant Hearing resumed his work of last season, and extended it to the eastward till he connected with Assistant Penny, at the Qua-na-kissee bayou.

The accompanying sketch will show the work executed by Assistant Hearing, which covers, according to his report, eleven square miles of hydrography, he having executed 208 miles of lines of soundings. Assistant Hearing completed his work by the 12th of October, at which time he was transferred with his party to Maumee bay, in Lake Erie, as will be more specially noticed hereafter.

The party under the charge of Assistant Penny, who were operating in the neighborhood of Fish Point (see sketch) about the middle of September, progressed, by the 12th of October, sufficiently far to connect with Assistant Hearing, as above reported, and were, at the same time, transferred to Maumee bay, Lake Erie. This extension of Assistant Penny's work amounted, according to his report, to 12½ miles of shore line, traced 212 miles of lines of soundings, and covering thirty square miles of hydrography and ten square miles of topography.

Assistant D. F. Henry, in charge of the third party, (during the absence of Assistant Lamson,) progressed, between the 15th of September and 25th of October, from Pine river, on the west side of the bay, to the termination of Assistant Hearing's work of 1856, near

the Pinne-cawling river, (see sketch.) In executing this work, Assistant Henry reports 12 $\frac{3}{4}$  miles of shore line traced, and 313 miles of lines of soundings, covering a space of 34 square miles of hydrography. Upon the completion of this work this party was withdrawn from the field.

The details of the work executed by the several parties since the 15th of September will be found in the appendix.

The expectation expressed in the annual report has been fully confirmed, as will be seen by the following recapitulation of work executed this season :

- I. The base line has been measured.
- II. The triangulation extending from it to cover that portion of Saginaw bay above the Charity islands is completed.
- III. The off-shore hydrography of the same portion of the bay has been executed.
- IV. The topography and hydrography of the shore line of the *whole bay* has been completed.
- V. The latitude and longitude of a primary station has been accurately determined, and the azimuths of several lines, constituting all the data necessary for the projection of the chart of a considerable portion of the bay, and leaving, to complete this data, only a few triangles to be observed, and the off-shore hydrography above the *Charity islands*.

#### *Survey of Maumee bay and Lake Erie.*

Towards the close of the season I was instructed by the bureau to revise the survey of Maumee bay, made in 1844, provided the character of the season should prove favorable on closing operations in Saginaw bay. The parties of Assistants Harding and Penny having closed their labors in Saginaw bay on the 12th of October, as above reported, they were transferred immediately to Maumee bay, with written instructions from myself as to the character of the operations to be executed there. At the time of detaching these parties it was hoped the survey of 1844 would prove of assistance, at least so far as the measurement of a base and the necessary triangulation, and that it would only be necessary to identify and renew the old stations, and determine from them the positions requisite to ascertain if any important change had occurred in the hydrography. Upon arriving on the ground, however, it was soon ascertained that all traces of the previous survey were obliterated by time, and that it was necessary to begin anew. Assistant Harding, who was assigned to the upper part of the bay and river, measured a base accordingly, and carried from thence his triangulation into the river. The bay was also sounded out, and the survey extended up the river to the railroad bridge at Toledo.

In executing this work, (the details of which will be found in the appendix,) Assistant Harding reports 18 miles of shore line traced, 208 $\frac{1}{2}$  miles of lines of soundings, covering 10 $\frac{1}{4}$  square miles of hydrography.

Assistant H. C. Penny, to whom was assigned the lower part of the

bay, connected his triangulation with two of Assistant Harding's stations, and carried his hydrography outside of the bay into the deep water of the lake. Upon the termination of the measurement of the base line, I proceeded in person in the steamer Search to Maumee bay, arriving there about the 2d instant. Finding on my arrival so much progress made towards a complete *resurvey* of the bay, I determined, notwithstanding the lateness of the season, to continue operations, in the hope of pushing the work to a close before the weather assumed a character rendering a cessation of operations imperative. For this purpose, as Assistant Penny had that portion of the work which was the most exposed, and therefore the most liable to interruption from the weather, I left the steamer Search in charge of Assistant J. A. Potter, with instructions to assist in bringing Mr. Penny's work to a close. By close and persevering adherence to the duty, and improving every hour of available weather, the work was completed by the 14th instant, and the parties withdrawn from the field. Assistant Penny reports 11 miles of shore line traced, 380 miles of lines sounded, and 27½ square miles of hydrography.

A survey of Maumee bay, complete in itself, has thus been executed by these parties in less than a month's time, during weather which at times required severe exposure, more than under other circumstances I should have asked them to endure, for their cheerful endurance of which, and their successful completion of the task assigned them, I desire to record here my commendation, and to return them my thanks.

The work of projecting the survey will be immediately commenced, and a chart of Maumee bay, of great commercial importance, prepared for publication.

#### *Demarcation of the Public Lands on the Island of Mackinac.*

This work was in progress when the annual report was submitted. It is one of those duties which are from time to time assigned to the survey of the lakes, in consequence of the facilities afforded by its organization for such duties.

The public lands on the island of Mackinac, consisting of the military reserve and other government lands, had never been clearly defined in their limits. The island having become settled and covered with private claimants, frequent controversies arose between the commanding officer of the garrison and owners of private lands, as to the boundaries of their respective domains. Appeal was finally made to the War Department to have the public lands surveyed and marked out. The duty was assigned to the Bureau of Topographical Engineers, and by it to the lake survey, in 1855. In that year Captain J. N. Macomb, topographical engineers, (then in charge of the survey,) having been furnished from the General Land Office with copies of the records of the original survey, had the lines of this survey run out and connected with the detailed survey of the island, which he was making as part of the lake survey.

The lateness of the season and the exhaustion of the funds trans-

mitted to him prevented the demarcation by proper monuments of the limits of the public lands.

In the month of August last I received instructions from the bureau to complete this work, and was supplied with the necessary funds.

Assistant G. W. Lamson, who had made the survey under Captain Macomb, was detached and assigned to this duty, which he completed by the 15th of October. A special report and map were transmitted to the bureau on the 10th instant, and the fact communicated, that the public lands on the island of Mackinac were now marked by stone monuments, placed at each angle or point of intersection of the boundary lines. The monuments are posts of limestone, sunk to a depth of  $2\frac{1}{2}$  feet and extending 6 inches above the surface of the ground. The tops of them, 10 inches square, have cut in them lines which, by their direction, show the true courses, and, by their intersection, the angle formed by the boundary line at the point where they are placed. The map transmitted to the bureau has these boundary lines drawn in red, with the true course and distance between each point, and represents by the angles or intersection of these red lines the position of the stone posts as placed in the ground, of which there are in all 52.

### *St. Mary's River.*

Advantage was taken of the detachment of Assistant Lamson to direct him to make certain examinations on the River St. Mary's, which the projection of the notes of the former survey had shown were required. This was particularly the case in Lake George, where a channel is now known, the existence of which not being known at the time of the survey was only imperfectly shown upon our map.

This accidental omission was rendered the more accountable from the fact that two channels had been found in that lake, and much time spent in minutely surveying both. Independent, however, of the accuracy of the work, this question had assumed greater importance from the fact that Congress had made an appropriation for the improvement of Lake George, and it was not possible to determine, without more minute examination of the ground, whether the new or "middle channel" was better adapted or not for improvement than the one designated in the act of Congress making the appropriation.

Assistant Lamson has now made a minute examination of the "middle channel" which will be incorporated in the chart of Lake George, nearly ready for publication, so that the survey will furnish, should any discussion arise, the necessary data for the solution of the same.

### *Estimate.*

The estimate submitted with the annual report was based upon the earnest hope then indulged in that Congress would appropriate more liberally for this important work, and it included items for the extension of the survey over all the great lakes at the same time.

The financial revulsion which has since occurred, extending over the whole country, and affecting directly the revenues of the govern-



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ment, preclude the expectation of any very large increase to the annual appropriation. At the same time I cannot conclude this report without expressing the hope that the bureau and the department will use their influence to procure, at least, the amount of the estimate for carrying on operations in one lake, to do which with proper vigor and efficiency, and to employ the equipment and material now on hand to the best advantage and with the most economical effect, will require, as the estimate states, about \$75,000.

I would also call the attention of the bureau to the necessity of an increase of appropriation for the publication of the results of the survey.

The charts issued by the survey are from year to year increasing in number, and necessarily require a corresponding increase of means to engrave new, and continue the reprinting of old plates.

The demand for these charts continues to be very great, and the better they become known and their value appreciated, the larger will be the demand—particularly if the plan be continued of issuing them gratuitously to navigators.

It is already becoming difficult to supply this demand from the deficiency in the means to reprint the old charts. And as the number of charts increase, and the demand increases, unless more means are furnished, the whole fund now annually appropriated will be required for the engraving of the new plates.

Very respectfully, your obedient servant,

GEO. G. MEADE,

*Captain Topographical Engineers, in charge of Lake Survey.*

Col. J. J. ABERT,

*Corps Topographical Engineers, Washington, D. C.*

“SURVEY OF THE NORTH AND NORTHWEST LAKES”—“SUPPLEMENTARY REPORT.”

### *Appendix No. 1.*

Amount of work executed in Saginaw bay subsequent to September 17, 1857, by the party under the charge of Captain George G. Meade, on board the steamer Search.

360 miles of lines sounded.

210 sextant angles.

3 shore parties moved and placed in position.

4 miles base line measured.

### *Appendix No. 2.*

Work executed by the party under Lieutenant O. M. Poe, in Saginaw bay, subsequent to September 17th.

17 stations occupied.

1,281 pointings of telescope.

410 readings of theodolite.

170 angles measured.

*Appendix No. 3.*

Work executed<sup>d</sup> by the astronomical party under Lieutenant U. N. Turnbull, topographical engineers, subsequent to September 17, 1857.

- 7 transits of moon and moon culminating stars.
- 1½ miles of base line graded.
- Observations for magnetic dip and variation.
- 80 meteorological and water-level observations.

*Appendix No. 4.*

Amount of work executed in Saginaw bay by the party under Assistant W. H. Harding, subsequent to the 17th September.

- 4 triangulation stations built.
- 18 sounding stations built.
- 40 stakes located.
- 38 buoys put out and located.
- 13¾ miles of shore line sketched.
- 885 pointings of theodolite made.
- 42 sextant angles.
- 1 bench-mark established.
- 1 observation for verification of true meridian.
- 11,281 casts of lead.
- 182 lines of sounding run.
- 166½ miles of sounding.
- 16 compass readings for variation taken.
- 16 square miles of hydrography covered.

*Appendix No. 5.*

Amount of work executed in Saginaw bay by the party under Assistant H. C. Penny, subsequent to the 17th September.

- 19,039 casts of lead.
- 30 square miles of hydrography.
- 18 square miles of topography.
- 212 lines of soundings run.
- 293½ miles of soundings run.
- 961 readings of theodolite.
- 26 pointings of telescope.
- 5 angles measured.
- 12½ miles of shore line traced.
- 7½ miles of marsh surveyed.
- 17 buoys placed out and located.
- 58 sextant angles observed.
- 9 sounding stations built.
- 6 compass readings.
- 2 observations for true meridian.

*Appendix No. 6.*

Amount of work executed by the party under Assistant G. W. Lamson, in Saginaw bay, subsequent to the 17th September.

- 14,823 casts of lead.
- 338 lines of soundings run.
- 313 $\frac{1}{2}$  miles of soundings.
- 34 square miles of hydrography.
- 65 buoys put out and located.
- 304 sextant angles.
- 13 sounding stations built.
- 1 triangulation station built.
- 12 $\frac{2}{3}$  miles of shore line run.
- 2 $\frac{1}{2}$  miles meandering.
- 499 pointings of theodolite.
- 11 compass sights.
- 85 records of height of water.

*Appendix No. 7.*

Amount of work executed in Maumee bay by the party under Assistant W. H. Hearding, subsequent to the 10th of October.

- 32 triangulation stations built.
- 1 base line, 1 mile, 4,900 $\frac{1}{2}$  feet measured.
- 58 sounding stations built.
- 23 buoys placed out and located.
- 18 miles of shore line sketched.
- 1,014 pointings of theodolite made.
- 9 sextant angles taken.
- 1 bench-mark established.
- 1 observation for true meridian taken.
- 13,623 soundings taken.
- 156 lines of sounding run.
- 208 $\frac{1}{2}$  miles of soundings run.
- 26 compass readings taken.
- 10 $\frac{3}{4}$  square miles of hydrography.

*Appendix No. 8.*

Amount of work executed by the party under Assistant H. C. Penny, in Maumee bay, subsequent to the 10th of October.

- 29,097 casts of lead.
- 425 lines of soundings run.
- 379 $\frac{1}{2}$  miles of line sounded.
- 27 $\frac{1}{4}$  square miles of hydrography.
- 2 $\frac{1}{4}$  square miles of topography.
- 64 buoys placed out and located.
- 8 sounding stations built.
- 4 triangulation stations built.

- 708 readings of theodolite.
- 26 angles measured
- 158 pointings of telescope.
- 73 sextant angles observed.
- 11 miles of shore line traced.

### *Appendix No. 9.*

Amount of work executed in Maumee bay by the party on the steamer, under the charge of Assistant J. A. Potter, subsequent to the 2d of November.

- 60 miles of line sounded with steamer.
- 2,200 casts of lead.
- 4,600 small boat soundings.
  - 1 triangulation station built on top of light-house.
- 34 lines small boat soundings.
- 1 angle measured.
- 45 pointings of theodolite.
- 48 miles run on general duty.

Assistants Harding & Penny's party withdrawn from field and brought to Detroit.

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## APPENDIX H.

ST. LOUIS, MISSOURI, *February 19, 1857.*

COLONEL: I have the honor to forward the following report concerning the operations of the party under my command on the road from Fort Riley to Bridger's Pass. The party was composed of the following named gentlemen, assistants: Mr. John Lambert, topographer; Mr. Henry Engelmann, geologist; Mr. Charles Larned, in charge of barometers; Mr. Cooper and Mr. Wood, rodmen. Having met the escort at Fort Riley, I left that post on the 21st of June.

Two routes presented themselves for consideration and survey before a location could be definitely fixed upon. One from Fort Riley to Fort Kearney, crossing the divide between the Republican and the Platte, and skirting the headwaters of the small streams running into the Blue; then from Fort Kearney, along the Platte valley, to near the mouth of Pole creek; thence up Pole creek, through the Black Hills, to its head; and thence along the foot of the Medicine-Bon Mountains to the North Platte, and thence to Bridger's Pass, about forty miles distant from the crossing of this stream. The other lay along the Republican fork of Kaw river for three hundred and sixty miles; thence across the divide to the South Platte, where it turns to run into a southeasterly direction; thence up the South Platte, along its right bank, crossing Beaver, Bijou, Kioway, and other small creeks; thence on the left bank of the Platte to the mouth of Crow creek; and thence over to the Cache la Poudre, and up it to the foot of the Medicine-Bon range, in the Laramie plains, and thence to Bridger's Pass,

over the same ground as by the other route. It was determined to examine the route along the Platte first, and take the route along the Republican on the return. For this purpose the party left Fort Riley, and followed along the left bank of the Republican for more than a hundred miles, and as long as the direction of the river coincided with that from Fort Riley to Fort Kearney. Leaving the Republican fork, there was about thirty-five miles of a high, dry, rolling prairie to the Little Blue. This space was intersected by the heads of creeks running into the Republican and the Blue, and is entirely destitute of timber, except the small quantity which grows immediately on the banks of the streams, and which consists generally of hard woods, such as oak, ash, &c. Very little obstruction is offered, generally, to the passage of wheeled vehicles—now and then the steep banks of a creek which require several hours to cut away and make passable. The crossing of the Blue was effected without difficulty, the river being here not more than fifty feet wide and two and a half feet deep; bed sandy and banks easily prepared for crossing. At this point this route turns into the road from Fort Leavenworth to Fort Kearney, and coincides with it up to that point. This part, for some thirteen miles, lies along the river valley, and then leaving, leads to the valley of the Platte over a high, dry, rolling country. It is supplied with water at intervals of fifteen, eight, and then four and a half miles, to the Platte river, by large water holes, which are considered permanent. From the point of touching the Platte, the distance to Fort Kearney is fifteen miles, and over a smooth, level country, being along the valley of the river.

In this division of the road lies most of the labor necessary to render the route between Fort Riley and Bridger's Pass easily travelled. Most of the creeks which are crossed are deep, with steep banks, and, in some instances, require bridging, and in almost all the approaches to the crossing need grading. Leaving Fort Kearney, the route lies along the valley of the Platte to a point about sixteen miles beyond the Laramie crossing. It is the route generally travelled to Fort Laramie, and has been so often noticed that no description of it is necessary here. The route followed by my party and its escort crosses the Platte at sixteen miles above the Laramie crossing, keeping to the right bank of the river thus far to avoid the bluffs and rough ground which here juts close in upon the river. The crossing used by the party was an excellent ford at a point where the river is about six hundred and ten yards wide. The water scarcely came up to the axletrees of our wagons; the bottom was of fine, hard gravel, so that our crossing was effected without any difficulty. This, however, like all the crossings of the rivers in this part of the country, is liable to injury from flood, and to become affected by quicksand. As to the expediency of bridging this stream, it is a matter totally out of the question. There is not a particle of material of any sort near enough to be used, especially within the limits of the present appropriation. Trains passing must, therefore, always be prepared to take the chances of the ford. From the crossing of the Platte to the head of Pole creek forms the next division of this road. Our route lay along the Platte to Pole creek, a distance of eight miles, over a very level country.



Our crossing was effected without difficulty at a point about a mile above the mouth. The creek is here a swift flowing stream, between high banks, with a width of six or eight feet. The country here, and for some miles further up, is a high, dry prairie—a dead, flat, burned up piece of ground. Our route lay on the right bank. The valley of the creek is here two or three miles wide, but becomes narrow further up. About five miles from our crossing brought us to a spring running from the bluffs on our left into the creek. Here was the first appearance of green grass that we had seen along the creek, except immediately between its banks: Three or four miles further on was another green spot, where we camped, having made eighteen miles. The country is extremely barren and burnt up; nothing green to be seen except the willows and grass immediately along the banks. The higher ground is covered with buffalo grass, which is now burnt dry.

Scarcely have we seen anything resembling a tree since we were many miles below the Laramie crossing of the Platte. The soil is mostly sand and gravel. On the higher ground the soil is almost as light as ashes. During yesterday and to-day we have made quite a bend. Had we known exactly the direction in which the creek ran in this part of its course, we might have come straight over from the Platte. This line across this bend deserves a reconnaissance.

*Wednesday, July 23.*—The country to-day shows more grass. With this exception it is the same as yesterday, very barren, light and dry. The surface is almost all that could be wished for our teams; some few hollows appear, but offer no serious obstructions. The valley is of varying width, and the creek, in its windings, touches the bluffs on one side and then the other. Camped at the end of 20.10 miles.

*Thursday, July 24.*—At  $7\frac{1}{2}$  miles from camp we crossed without difficulty to the left bank, the bluffs coming so close on to the creek as to interfere with our purpose on the right bank. The country is varied but little from yesterday, the bluffs being higher and more irregular and the valley narrower. The grass appears better now; not so much parched up. Cedars, too, appear, scattered on the bluffs, intermingled with a few pines. The creek is very crooked, and with quite a swift current, indicating a great fall. Made to-day 18 miles.

*Friday, July 25.*—Kept along the valley of the creek until we came to a point of the Pine Bluffs, which jutted close into the creek. This rough place in the road (the only one of any consequence which we have met with) occasioned some little delay to the passage of the train. About a mile beyond this point the water of the creek suddenly disappeared, and was not seen again for twelve miles, although it had just previously been a bold running stream, more so, indeed, than usual, from the recent rains which had somewhat swollen it. At  $8\frac{3}{4}$  miles from our camp we crossed the dry bed of the creek and kept on our course till we had made  $19\frac{1}{4}$  miles, when we camped on the right bank of the creek, where the water was running as briskly as ever. Our course to-day has been very straight and over a fine, hard prairie, having a gradual and constant rise, giving an excellent location for a road of any sort. The bluffs gradually fell as we ascended the creek, and have now almost entirely given way to gentle swells on either side. The grass is also much better than below, and



affords pasture to immense herds of buffaloes. This part of the valley is a favorite winter residence of the Sioux and Cheyenne bands.

*Saturday, July 26.*—Kept our way up the creek, finding all the way a fine hard soil for the road. There were several gulleys to cross to-day, affluents of the creek. None of them presented any difficulty. The valley of the creek is now so narrow that we have been obliged to cross it several times, but always without difficulty or delay. Camped on the right bank, after a march of 16 miles.

*Sunday, July 27.*—In camp.

*Monday, July 28.*—Marched to-day 13½ miles to the Pine Bluffs, where we camped on a small spring running into Pole creek, which is dry at this point and for about eight miles further up. Just below our camp a branch, called Didies' branch, comes into Pole creek on the northern side. It takes its rise in a line of bluffs which lead on to Horse creek. A route from this point to Laramie is said to be feasible, passing by the head of Didies' branch, thence on to Horse creek, and then to the Platte river, eight miles below Laramie. In favor of this route is urged the constant supply of running water, a fine hard soil to travel over, and the absence of the sand hills, which interpose such a serious obstacle to the passage of heavily loaded trains. These Pine Bluffs afford an abundance of dwarf pine, which answers well for fuel. As this article is very scarce beyond this point, and until the Black hills are reached, it is necessary to transport enough for several days' use—buffalo chips, which have answered heretofore, being scarce. The bluffs run in a northerly and southerly direction, and Pole creek cuts directly through them, making a wide, level valley, through which wagons can pass without the slightest difficulty. Pawnee creek heads to the south and in the same bluffs. In Didies' branch the water is always running.

*Tuesday, July 29.*—Marched 13 miles, to the point where the New Mexico and Laramie road crosses Pole creek, and camped as the creek again sinks; and we are ignorant how far it is to where water again appears. Water, however, can always be had by digging. Road to-day very good, and soil of the same gravelly character as yesterday.

*Wednesday, July 30, 1856.*—Course to-day over a high, dry prairie, rising rapidly all the time, but furnishing a most excellent smooth road. Travelled over this country for twelve miles, where we found water again running in the bed of the creek. At seventeen miles we intended to make our camp, but found the creek at this point again dry and water difficult to obtain by digging. Made 24½ miles, and found water running and made our camp. The route to-day has been over ground singularly smooth and good. In the latter part of the day's march there were some hollows, but not very difficult to cross. Timber and buffalo chips have almost entirely disappeared, and, but for the wood brought from Pine Bluffs, we should suffer for fuel. The grass on the upland is very poor, short, and dry, the soil hard and gravelly.

*Thursday, July 31.*—Marched about 7 miles to-day, merely to change camp, over a high, rolling country to another point of the creek, where was good grass and a fine spring. Camped for the day, as the animals are much fatigued by yesterday's long march. Coun-

try the same as yesterday, very poor and desolate. Pole creek is now a very small stream, the water running only at intervals and the bottoms very narrow, and the supply of grass for our animals very limited.

*Friday, August 1, 1856.*—Followed to-day a high ridge on the right bank of the creek, which furnished a fine, smooth track for our wagons. The country still rises rapidly. After eight miles travelling there were some hollows, but no difficulty was experienced in crossing them. Three and a half miles further brought us to our camp at the foot of the Black hills, and on Pole creek. Here we found quite wide bottoms, with plenty of grass for our animals. The two forks of Pole creek here met to make the main stream. The creek has so far furnished an excellent route, so far as the track is concerned, but there is a great deficiency of fuel, other than buffalo chips, and at this season of the year grass is very scarce. Water at this time of the year is met with at intervals along the bed of the creek in the upper part of its course. It is flowing whenever seen, but, owing to the porous nature of the soil, it disappears and the bed of the creek is dry for several miles together. Water can generally be obtained, wherever the stream has sunk, by digging under the bluffs and in the bed of the stream. Large quantities of drift wood were found here, which proved of great assistance to us in the way of fuel.

*Saturday, August 2.*—Following the southernmost of the two prongs between which we had encamped, and after passing over some high prairies, we arrived at the entrance to the Black hills, a steep ascent, which was accomplished, however, by our teams without much difficulty. The ground was rough and strong, and for about a mile and a half further on the pulling was quite even, being up hill and down. At this point there was a fine spring, at which the road ascended a ridge, and kept afterwards on the divide between the northern and southern prongs of Pole creek. This was exceedingly smooth and of a very gradual ascent, giving an excellent road. This ridge was followed for about twelve miles, and then the country became rolling, with scattered boulders of granite. A little work was necessary to put aside some of them, and we proceeded easily. Four miles further, over a rolling country, brought us to our camp, on a side hill and near a spring running into the southern fork.

On the other side of this south fork, and directly opposite our camp, the mountain was thickly covered with straight young pines, affording lodge poles to various bands of Indians who resort to this point to supply themselves. From this circumstance the creek derives its name. Our route to-day lay for the most part along an Indian trail, information of which was obtained from Eagle Head, an Arapahoe.

*Sunday, August 3.*—Remained in camp.

*Monday, August 4.*—Leaving camp about 9 o'clock, in about a mile and a half we reached the summit of the Black hills, the dividing ridge between the waters of Pole creek and Laramie river. The ascent was difficult to this point, but there was no necessity to double teams, the road having been somewhat prepared before leaving camp. Near the summit is a fine spring, which is considered the head spring of this branch of the creek. The descent from this point was easy

and gradual, and about 1 o'clock we found ourselves on the right bank of the east fork of Laramie river; the last five miles being across the rolling prairie of Laramie plains. The country is poor and sandy; sandstones appearing in abundance in our descent. The Laramie river at this point very much resembles the Platte, affords good water and grass, but no wood. Our fuel was brought in wagons from the hills which we had just left, and which furnish a great deal. These hills appear to have been once covered with trees, but they have been torn up by the winds, the thin, rocky soil not furnishing sufficient hold for their roots.

Laramie river has a quicksand bottom; but we found a fine, hard ford, the water reaching only to the axletrees of the wagons.

*Tuesday, August 5.*—Our route for to-day was across the plains from the east to the west fork of Laramie, a distance of fifteen miles. Camped on the right bank of the west fork, a beautiful mountain stream, flowing from the Medicine-Bon mountains; on our left over a fine, hard bed of gravel and pebbles. The water is clear and of an icy coldness.

*Wednesday, August 6.*—To-day crossed the west fork without difficulty, and in about a mile struck into the emigrant road along the foot of the Medicine-Bon. This road we suppose to coincide with the train followed by Captain Stansbury. The road to-day is very good, having occasional ascents and descents, and over a fine, hard gravel; it is, however, very destructive to the feet of our animals, many of them losing their shoes, and becoming tender footed in consequence. Trains travelling through this country should be well provided with those indispensable articles, horse and mule shoes, and shoe nails, as many are worn out and lost. A forge would be necessary for a large train. Camped after a march of fourteen miles on a small creek of good water. This we called Cooper's creek; it runs into a large lake some ten miles off in the Laramie plains. Several large lakes were passed to-day lying to our right; they are visible from the hills near the camp.

*Thursday, August 7, 1856.*—The train moved on to-day over the beaten track of the emigrant route, and, crossing a number of small creeks, on which it could not encamp on account of the lack of grass for animals, passed on to the west fork of Medicine-Bon creek. The road was generally very good, being very much like that of yesterday. In some places the ground was covered with loose stones, which it is only necessary to remove to insure a good road. In other places there are several long ascents and descents; but these cannot be avoided, as they are caused by spurs from the hills which run for a long distance into the plain, and must be crossed almost at right angles. To cut through them, for the sake of a more level road, would cost immensely, especially in the present unsettled state of the country, as a party and its means would have to be transported so far. The hills to the left of our route are covered with pines; they are from six inches to eighteen and twenty-four in diameter, and, were they more accessible, would furnish inexhaustible supplies of fuel and timber. In many places this timber can be reached without much difficulty. The head valley of the west fork of Laramie river is one

of these places, and would make an excellent site for a military post and settlement, as there is abundant grass for grazing and hay for winter use, excellent water, and timber for building and fuel. The train arrived at camp at 6 o'clock, having had a long and fatiguing march. From the rough, hard soil, and many loose stones, many of our animals lost their shoes and became lame. We found it necessary to remain in camp next day to put on fresh shoes and make repairs.

*Friday, August 8, 1856.*—Remained in camp on the Medicine-Bon, (west branch.) The bottom of this creek is broad and stony; soil sterile, and grass very poor, thin and scanty, especially at this season. Fuel is abundant. This fork of the Medicine-Bon creek is said to be famous as a trapping ground for beaver. The Medicine-Bon butte, and the interval between it and the main Medicine-Bon range, is a noted region, in which the different bands of Indians—Sioux, Snakes, Utahs, Arapahoes, and Cheyennes—settle their difficulties. From the frequency with which war parties of these different tribes are met, it behooves any party of whites passing through the country to be well on their guard.

*Saturday, August 9, 1856.*—Marched eight miles to find camp at the head of Pass creek, and under the Medicine-Bon butte, and to the south of it. There is good water here from the creek, and a fine body of good grass, which proves very acceptable after the short rations at West Medicine-Bon creek. The fuel is at some distance on the hills; we were obliged to bring it in our wagons. The creek, I suppose, takes its name from the locality of its head, being in a pass between the Medicine-Bon butte and the main Medicine-Bon ridge. We experienced here very cold weather for the season; ice forming in our tents at night. To-day was again mostly taken up in shoeing animals which had loose shoes, and had become lame from the effects thereof.

*Sunday, August 10, 1856.*—Remained in camp.

*Monday, August 11, 1856.*—Crossing the creek, we followed an Indian trail leading down the right bank, until the hills came so close to the creek that we were obliged to take to the road again. This we had avoided as much as possible to-day, as it led over a succession of ascents and descents. Even after we entered the road again we were obliged, for about three miles, to make our way almost at right angles across the spurs coming down from the Medicine-Bon butte on our right. In some places the road ran over side hills so steep that it was necessary to hold up the wagons with ropes. Two wagons here overturned in making the passage. This three or four miles through the cañon of Pass creek would require a good deal of work, a weeks' work for a company. The road should follow the creek more closely than the present one does, and when the hills come too close it might take the immediate valley crossing, and recrossing the creek as became necessary, and without difficulty, as there is a fine pebbly bottom. After leaving the cañon the present road keeps the left, or south bank of the creek. It might be changed to the north bank for some distance from the cañon, and be improved. After leaving the cañon the road is generally very good, being through a sage prairie, and over a

hard, gravelly soil. We passed an emigrant's grave (Pickens',) at a good camping place, where the road touches the creek; kept on, making eleven miles to good grass and water and plenty of fuel. Sunday was spent making a reconnoissance of a pack trail, which it was supposed would furnish a better route than the road. This, however, proved not to be the case, as the country was more broken, and would have required more work than through the cañon of Pass creek.

*Tuesday, August 12, 1856.*—Eleven miles of travel this morning through sage bushes, and over a hard, gravelly soil, brought us to the North Platte, a beautiful mountain stream, flowing over large stones, pebbles, and gravel. The bottom of this stream is several hundred yards wide from the bluffs on one side to those on the other. The bluffs on the west, or left bank, at this point are not high, and are of earth; those on the right bank are several hundred feet in height, and composed of layers of stone, and very steep. They enclose the river for miles, and render access to it, except at certain points, impossible for wheeled vehicles. The country for several miles back has been rolling, or rather in plateaus, one below another, as we approach the river. Over these wastes no vegetation is to be seen except the sage plant. The river bottom, in which we encamped, is wide and level, and furnishes tolerable grass for our animals. Fuel is abundant from the cotton-wood trees, which abound at this point. On the western bank there are several unfinished houses. These were put up for trading houses, but subsequently abandoned, as being too much exposed to the assaults of hostile Indians.

*Wednesday, August 13, 1856.*—Leaving the North Platte, and following the beaten road (Evans',) for about twelve miles, we came to a narrow stream running between steep banks, which we supposed to be Sage creek. The country over which we passed is a good deal broken and water washed, and miserably poor and desolate. It is almost entirely destitute of vegetation except the sage plant, and an occasional tuft of grass, the intervals between these being quite bare, or covered with fragments of broken stone and gravel. The surface is much cut up by gulleys and ravines, and sudden descents from one plateau to another, which caused the road to wind a great deal. A sufficient amount of cutting to make a straight road would involve a great deal of expense in such a desolate country, so far from supplies of all kinds, and especially of forage. A few miles from the creek we left the road, and turned more to the left, towards the mountains, for the sake of grass for our animals, of which there was not a particle to be found on the creek, or anywhere else on the more level portion of the country. After crossing the creek the surface of the country is more level and favorable for a road, still of the same clayey nature, however, and covered thickly with sage plant, which proves a great impediment to our animals and marching men. Some miles beyond the first creek we crossed a small gully, with yellowish water standing in holes; still not a particle of grass to be seen. Finding no grass, we made towards the mountains, which we reached about sunset, after a most fatiguing and wearying march of twenty-four miles over a loose soil and unbroken sage plants. The soil is very light, and soon gave plenty of dust, sinking under foot like snow, and fatiguing

the marching men. The mountain under which we encamped has its sides covered with aspen trees, and is supposed to be the Aspen mountain, mentioned by Captain Stansbury in his report on this part of the country. At its foot there is a beautiful stream of clear water, with a little grass on its banks. This stream is one of the heads of Sage creek, crossing the more level country to the main stream. Other small streams break from the sides of the hills, and on their heads we found sufficient grass for our almost starved animals.

*Thursday, August 14, 1856.*—The trains remained in camp to-day to rest the animals, to give an opportunity to make a reconnoissance of the country ahead. As none of the guides had ever been through "Bridger's Pass," though they had been long in the mountains and in that part of the country, and as the appearance of the country did not tally with Captain Stansbury's description of that about the Pass, we supposed that we had not struck the exact locality. The result of our examinations made us still more strongly of opinion that we were at a different point from that described as Bridger's Pass, but we could not be far off, and provided we could get through a practicable pass over to the western slope, it was not of much consequence as to the exact spot. I wished to go to the exact spot of course, but there was not one of all the guides and mountain men who had ever heard of such a place. The Pass, as laid down on the map, appeared between the head of Sage creek, flowing eastwardly into the Platte, and Muddy creek, flowing westwardly into some of the branches of Green river. If an easy route could be found from Sage creek to Muddy creek, it would answer all purposes. Accordingly, a party left camp, and climbing to the top of the hill before us, we found an open, smooth plateau, inclining gently to the west, and answering the description given by Captain Stansbury of the country over which he travelled after leaving Muddy creek. Following the edge of this plateau in a westwardly direction, we found a valley on our right of two or three miles in width, having an appearance as if the high table land had been cut through from one side to the other. From the edge of the plateau the head prongs of Sage creek could be seen running eastwardly, and those of Muddy creek to the west, interlocking so closely that, at some distance, it was difficult to distinguish the channels of the two creeks. Thinking that through this valley lay the proper location of the road, we descended from the plateau and followed down the valley of Muddy creek for some distance, making sure that its waters flowed westwardly. On our return the valley was examined as to its practicability for passage by our wagons. The result of the examinations corresponded with our expectations, and it was determined to bring the train through on this route.

*Friday, August 15, 1856.*—Left camp at six o'clock this morning, and after eight hours' marching and cutting on the banks of a few gulleys and small streams, found ourselves in camp on Muddy creek. The surface of the ground was very favorable, but the thick growth of sage was very much in our way, obstructing the passage of the wagons, and fatiguing men and animals very much. This, however, forms no permanent obstacle, as the passage of a few trains would soon break down the sage and cause it to disappear. In about seven miles



we attained the highest point of this valley. There is an ascent to this point, both from the east and from the west, by keeping along the valleys of the small streams which run into Sage and Muddy creeks. The water in Muddy creek was running slowly; some trout were taken in the pools of Muddy creek. The only grass in this part of the country lies along the small streams, where they issue from the hills. We found it necessary to herd our animals on those spots, in succession, no one place having sufficient for the whole of them. On this account, a large train could scarcely travel through this country, much less remain any time in it. If it did, it would be necessary to transport forage for its animals. The sage plant furnishes quantities of fuel, and of a good kind for camp purposes, being dry and easily kindled. Opposite to the summit there is a green place in the hills on the north, indicating a spring. Here grass enough may be found for a small train for several days, and also in the dry hollow running into one of the heads of Sage creek. The soil is of clay, the surface to the south much cut up by water. Spurs from the hills on the south run nearly across the valley in some places, in others ridges run nearly parallel to the general course of the valley. These caused the road at some points to wind a good deal.

Distance travelled to-day, twelve and three-quarter miles.

Having thus completed the reconnaissance to Bridger's Pass, or to the nearest practicable point to it so far as we could ascertain, gone through the Pass and encamped on the western slope on waters running into the Pacific streams, it only remained to find out on our return if there was any route preferable to that by which we had come. We were forced to commence our return forthwith by fear of starvation for our animals, so little subsistence of any kind does this region afford.

*Saturday, August 16, 1856.*—To-day retraced our steps of yesterday for about eight miles to a beautiful little valley, and camped in front of a growth of pines, where we found good grass, wood, and water.

*Sunday, August 17, 1856.*—Remained in camp.

*Monday, August 18, 1856.*—After a march of three miles came opposite the camp of August 13 and 14. Here we turned to our left, (north,) instead of following the outward route. This change gave us an excellent road, much smoother than the route before followed, and nearer to the creek. This route inward has a few places where the banks have to be cut down, but it is generally much smoother, and better ground for travelling. There is less of the sage plant to be encountered, also. The camp was pitched on an island in the North Platte, where there was plenty of good grass, water, and fuel. Here it was deemed advisable to remain for a few days to rest our animals and burn coal for the forge. The point where we are now encamped is some five miles below where we crossed the river on our outward route. The country is a scene of utter desolation as far as the eye can reach. High bluffs, deep ravines, and a most sterile soil are the characteristics of the scene. The bluffs are composed mostly of clay, with layers of sandstones, and are formed by the action of water washing out the deep intervening ravines. The river near the camp is still enclosed by the same precipitous walls of rock, which permit



ingress and egress only at certain points. As we had determined to examine the north side of Medicine-Bon butte, to avoid, if possible, the cañon of Pass creek on the south side, this crossing of the river is very favorable for our purpose. Captain Stansbury had already reported that a practicable route existed to the north of the butte, but, as it had never been attempted with wagons, we hesitated somewhat to make the trial with so many teams. An examination in advance, however, showed where there was a practicable route, and it was determined to follow it.

*August 19, 20, 21.*—Remained in camp on the Platte.

*Friday, August 22, 1856.*—After a very circuitous route through the bluffs, and some work for the pioneers, we got on the level plateaux which hold on to the foot of the mountain. This gave a very level, straight road to Pass creek, where we encamped. At one point the inward and outward routes came close to each other; the former, though, is over much better ground. The bottom of Pass creek, where we encamped, is wide, and affords abundance of nutritious grass. The water, too, is clear and of excellent flavor. Fuel, however, is scarce, most of what we used being buffalo chips and drift-wood. Wood is more abundant higher up the stream.

*Saturday, August 23, 1856.*—Left our camp on Pass creek at 6½ a. m., and marching on our course came, in a couple of miles, to the spurs running down from the Medicine-Bon butte. The ascent to the first of these hills was very gentle; most of them were so. About four miles from camp there was one very difficult to ascend, and which obliged us to double teams. This was the only real obstruction on the route. The other obstacles were only such as were caused by small drains of ten or fifteen inches in depth, and the dense growth of sage-plants. About eight miles brought us to a small creek, which we think is the Rattlesnake creek of Captain Stansbury. Here a few minutes' work was necessary; then following along the valley we turned up the valley of one of its affluents, and followed it to its divide from Elk creek. Descending on the eastern side of this divide we found ourselves in the broad grassy bottom of a small creek running from the Medicine-Bon butte. It sinks in a marshy plain about a mile below our camp. Elk abounded in this vicinity, from which circumstance the creek gets its name. The grass on this creek, as on Pass creek, was good and abundant. Wood is in plenty, and the water excellent.

*Sunday, August 24, 1856.*—Remained in camp.

*Monday, August 25, 1856.*—Marched this morning seven and a quarter miles, to the west branch of Medicine-Bon creek. We passed several small creeks during the march, which appeared to sink in the prairie at the distance of a mile or two from our crossing. They furnished abundance of wood, water, and grass of the best quality. There were several ponds to our left, (north,) which appeared much frequented by ducks and geese. After crossing the west fork of Medicine-Bon, we turned to the left down the creek, and found a camp ground where the grass was luxuriant. The crossing was of the same character as that above, the bottom of the creek being covered with large rounded stones. At this crossing there are several

channels, most of which are dry. The valley here is narrow, and shut in by high bluffs.

*Tuesday, August 26, 1856.*—Left camp this morning at six o'clock, and ascending from the narrow, deep valley of the west fork, we emerged upon an open plain, and, keeping our course, reached, in about eight miles, a small running stream at the foot of some bluffs. Bridging this with little difficulty, we were obliged to clear away some loose stones, and then ascended the bluffs without trouble. Country then became rolling, and easily passed to Birch creek, where the ascent from the bed of the creek was difficult on account of loose stones and boulders. These were cleared away, and, after ascending, we kept on the course for a few miles, and, on the top of a ridge, came in sight of the outward road near Aspen creek. Bearing towards it, we came into the road, and camped on the creek at one o'clock. Where the new road comes into the old one, a pile of stones was made and a flag-staff put in. This will mark the point of divergence by the two routes of the north and south sides of the Medicine-Bon butte. From the camp on Muddy creek to this camp the return route is shorter by three and a half miles, and is, besides, much better provided with wood, water, and grass, and a better surface to travel over. The grass at this camp is thin and much parched.

*August 27 and 28.*—Followed the emigrant road by which we went out; camped on the 28th on the west fork of Laramie, about a mile above where we camped on our outward route. No fuel, except a little scattered drift-wood. Higher up the stream there is wood, and in the mountain from which this stream flows there is plenty of pine timber. The bottom of the west fork is very extensive, and much cut up by small streams. The soil is clayey, and, lying low, is very liable to overflow in wet weather, and to make travelling over it difficult. Grass, wood, and water are found in abundance at the head of this stream, and would furnish a post plentifully.

*Friday, August 29, 1856.*—Followed the emigrant road to-day, which is excellent, being over smooth, hard, gravelly soil, and very straight. Arrived in camp on East Laramie at 12 m., where we found excellent grass and water, and some fuel furnished by cotton-wood trees, of which there are a few scattered along the river. This stream furnished fish, of which the men caught a large supply.

*Saturday, August 30, 1856.*—Marched to-day over an excellent road to camp on a ridge lying between the head of two branches of the east fork of Laramie. The road crosses the branch on which we are encamped some distance below camp, making quite a bend to the south. This bend could be avoided by crossing the creek higher up, and obtaining just as good a location, though at the expense of cutting. Our camp is abundantly and excellently supplied with wood, water, and grass; wood is mostly of willow and aspen.

*Sunday, August 31, 1856.*—Remained in camp

*Monday, September 1, 1856.*—Left camp at the usual hour; the road, considering the nature of the country, is a very good one. It is circuitous, crosses many small streams, affluents of Cache la Poudre, and has some hills, where the pulling is somewhat difficult. But for a mountainous, broken country, it is very good, though there are

several places where it might be improved, either by working it or by a change of location for a few rods. The rocks are granitic, and the soil partakes of the same character, and forms a fine hard road bed. The country to-day has not been equalled in its broken character, except by the Pole Creek pass, through the Black hills. Even there, I think, the scenery is inferior to this. Made our camp on a small branch of the Cache la Poudre. Wood is scarce immediately at the camp, but plentiful at a short distance; water clear and good; grass thin and a good deal parched and dry.

*Tuesday, September 2, 1856.*—Crossing easily the creek on which we were encamped, and ascending a hill which offered little obstruction, we kept on over a very good road for some six or seven miles, to a creek on which were encamped a band of Arapahoës, under Little Owl, one of their chiefs. At the crossings of the small drains the road was encumbered with loose stones, which should be removed for a good road. This is caused partly by the breaking away of the earth and partly by stones and gravel brought down from the hills by heavy rains. These would always render these crossings rough and filled with stones. Bridges would obviate the difficulty, but there is not water enough, nor are these places sufficiently difficult of passage to warrant such an expense. A little beyond the Arapahoe camp the road wound through a narrow gorge and up a hill covered with loose stones, causing very severe labor to our animals for a short time. There was no avoiding this place, as a deep cañon of great extent prevented us from turning it. A little labor would make a good road up the hill. The rest of the route for this day was good to another branch of Cache la Poudre, where we found wood and water good and abundant. The grass, however, is thin and dry. This is a favorite camping place for emigrants from Arkansas and Texas.

*Wednesday, September 3, 1856.*—Our road to day ran through a valley all the way, bounded on both sides by rough hills. It is somewhat winding, frequently crossed by small drains, which are rough from being water-washed and the loose stones left on the surface of the ground. These only require to be removed to make an excellent road. The banks of the drains require to be smoothed somewhat, but every heavy rain would wash them again and make them rough. Most of these drains flow from our right to the left into a large, dry hollow, which crosses the road and empties into the creek. The creek itself, which is the main stream of Cache la Poudre, comes from the hills on our right. At ten o'clock we camped on it, at a point well provided with wood and grass. The bottom here is very extensive, and would furnish many tons of hay. Timber could also be obtained from the adjacent hills. This point possesses many of the requisites for a good military site, whenever it shall be deemed requisite to station troops in this part of the country.

*Thursday, September 4, 1856.*—Left camp at six o'clock, and in the course of a mile the road led through a narrow, steep defile. We found some difficulty in getting through our wagons from the steep ascent, but, as the cutting here would not be difficult, it would not take long to make an easy grade for wagons. From this defile we emerged into an open prairie country, and, turning the hill on our right, came again

to Cache la Poudre, which we crossed, the bottom being here, as elsewhere, covered with loose round stones, making the crossing laborious and difficult. Thence our route lay through the valley of the creek for twelve miles, and on its right bank. Crossing again, we camped on the left bank, after a march of fifteen miles, and having good grass, wood, and water in abundance. The right was preferred, as we obtained on that bank a smoother and straighter road, avoiding crossing Box Elder creek, which comes into Cache la Poudre from the east, and was reported to be deep and miry. The bottoms of Cache la Poudre are wide and beautiful, and the soil good.

*Friday, September 5, 1856.*—To-day continued on our way down the left bank of Cache la Poudre, which furnished us a smooth, hard road. The soil to-day was poor, producing little vegetation, and consisted mostly of reddish sand and gravel. Occasionally the surface was thickly covered with dwarf prickly pears, making the marching difficult and painful for our men and animals. Banks of the creek to-day have been steep and high, in places resembling bluffs. Camped on the creek about three miles from the South Platte, of which it is a tributary. Grass and fuel abundant.

*Saturday, September 6, 1856.*—Marched to-day over a very smooth prairie, bordering on Cache la Poudre and the South Platte, to our camp on the river at the mouth of Crow creek, where we had an abundance of the requisites—wood, water, and grass.

*Sunday, September 7, 1856.*—Remained in camp.

*Monday, September 8, 1856.*—Remained in camp. The party which had been sent to explore Crow creek not having come in the night before, it arrived in good health and condition to-day at 11 o'clock.

*Tuesday, September 9, 1856.*—Left camp at six o'clock, and, crossing the dry bed of Crow creek, directly afterwards crossed the South Platte. Crow creek is dry for about twelve miles from its mouth. At this point is a spring, and above water is to be met with in holes. At the forks there is a little timber. On the east side of the mouth of Crow creek there are the remains of some adobe trading houses. The Platte crossing is at this time a very good ford, and we passed over without any difficulty. These fords of the Platte, however, are very variable, being liable to be injured by the flood in the spring, and in some instances to be entirely destroyed, so that where fords have been quicksand bottom is found in place of them. Our road down the Platte to-day was mostly good and smooth, the greatest difficulty arising from the extensive beds of prickly pear during the first part of the march, and afterwards from the sandy nature of the soil. The route lay over an Indian trail for the greater part of the distance, and has been used at times by the wagons of Indian traders.

*Wednesday, September 10, 1856.*—Left camp at the usual hour, and, marching along the Platte over a very rolling country composed of loose sand, made  $11\frac{1}{2}$  miles to camp, having during the day crossed the wide sandy bed of Kiowah creek. The banks are high, and the road winds along the sandy slope to find a crossing. The creek is dry at this point, but about twenty-five miles above it is a beautiful running stream, with timbered banks and wide, grassy bottoms.

*Thursday, September 11, 1856.*—Continued our march to-day over an excellent road to Bijou creek, a distance of eleven miles. The surface of the ground was undulating, and the soil of sand, which was the only drawback; but this was not so loose or deep as yesterday, but afforded a fine hard road bed. We confined ourselves to the lodge trail, as it was generally straight and lay in our course. In fact, it would have been dangerous to deviate from it, as large tracts on either side are densely covered with prickly pear, which would have proved very injurious to our mules. Bijou creek is here a small stream, with a wide sandy bed; the water is slightly brackish. As with Kiowah creek, it is a fine stream nearer to its head than where we crossed it, though even there it is better than Kiowah creek.

*Friday, September 12, 1856.*—Still kept the trail to-day along the river, and at the end of 14½ miles camped on the river just above the mouth of Beaver creek. Our road for to-day was remarkably fine, being over a wide open plain and a hard gravelly soil. At this camp there were several bodies of dead Indians suspended in trees and lodges.

*Saturday, September 13, 1856.*—Marched to-day, 14 miles, to the point where we intend to leave the river. The route still followed the Indian trail, and lay over a country smooth, and was covered with grass, and of a hard gravelly soil. There is now nothing like wood to be found on the river, except a few small willows. A tree is very rarely to be seen. Our course to-day was nearly northeast to our camp on the river. We leave the river at this point to cross over to the Republican fork of Kaw river, anticipating a dreary march over sand hills and clay ravines.

*Sunday, September 14, 1856.*—Remained in camp. The water here, in the river, is nowhere more than 18 inches. One of the men of the party, Frederick Borthaux, died here at 10½ a. m., and was buried at one o'clock, on a ridge to the rear of the camp.

*Monday, September 15, 1856.*—Leaving the river, we marched for two or three miles over a good road, then into a belt of sand hills. The sand here, no doubt, is easily moved by winds, except when covered and protected by grass. Passing this sandy range, we came to a flat sandy prairie, covered with dog holes and gopher hills. A short distance after passing the sand hills was a large pond, apparently of permanent water. On our arrival we found this pond covered with ducks. Five or six miles further over an alternation of sandy flats and slopes brought us to our camp, on the headwaters of a creek tributary of the Platte. It has a sand bottom, and is thoroughly dry, except at its head, where a small stream is running, and there is water in holes. Wagons are apt to bog on crossing the bed of this creek. However, there is no necessity for this, as the creek can be turned by its head. The grass at this camp is only tolerable, water good, and fuel, except buffalo chips, entirely wanting. The road to-day, though heavy, is much better than was expected, and, in fact, would do very well for trains crossing from the Republican to the Platte.

*Tuesday, September 16, 1856.*—Ascending from the valley of the creek up which we were encamped, we came upon a high rolling prairie, surface hard and smooth. For the first mile or two, the cha-



racter of the country was wild, from the deep ravines and precipitous banks, caused by the action of the water. We passed on, however, without the slightest trouble or difficulty, and came to a gently undulating prairie, covered in many places with a luxuriant growth of buffalo grass. At several points the water was standing in holes; the grass in these places was green and good. Continuing our march over this pleasantly undulating surface, we came, at the end of about twelve miles, to a creek with bluff banks, in which water was standing in holes, on which we encamped. Dog towns were passed to-day. Near the camp was one of these towns, which was thickly inhabited. The water in one of the holes of the creek was brackish; the others, however, furnished very good drinking water, though it was too warm. This camp was well supplied with good grass; fuel, except buffalo chips, wholly wanting. The road travelled to-day is over a fine hard surface, and if water can always be had, which is somewhat doubtful, would make a very good route.

*Wednesday, September 17, 1856.*—Leaving the valley of the creek on which we were encamped, we presently found ourselves on a wide open prairie. About a mile and a half from camp, and about four hundred yards to the left, there was a large pond of water, which appeared to be deep, and was covered with ducks when we passed. From this point the country presented almost a dead level, so slight were the undulations. The ground was fine, hard, and level, and composed mostly of fine sand covered thickly with weeds. Grass was very scarce. At fourteen miles from camp, we arrived at a hollow where there was a little water, but not enough to camp on. Continuing our march, we came, at the end of twenty-two or three miles, to the foot of a range of sand hills, which rise between us and Rock creek; passing these, which were several miles across, we descended into the valley of a branch of Rock creek. This was a dry hollow, destitute of wood, grass, and water. Good grass was thinly scattered over the sand hills; but as there was no water, and the sand was too loose to hold picket pins, we did not dare to encamp here. Continuing our march four or five miles further, we arrived at another hollow, also belonging to Rock creek, where there was water on springy ground, covered with rushes and tolerable marsh grass. Here we encamped at 8 p. m., after a march of thirty-five miles. The range of sand hills is composed of loose sand, which, but for the grass, would be easily moved by the winds. The travel through these hills is very fatiguing to our draught animals.

*Thursday, September 18, 1856.*—Remained in camp to recruit our animals after the fatigue of the long march of yesterday.

*Friday, September 19, 1856.*—A march of eight miles this morning brought us to the crossing of the main Rock creek. Here it is a beautiful stream, flowing over a sandy bed, about eight or ten inches deep, and six or eight feet wide. It comes in from behind a ridge on our right. This ridge forms the divide between Rock creek and the tributary on which we were encamped yesterday. To-day our route is over a barren sandy soil, slightly covered with cactus and weeds of different kinds. The ground was fine and rolling, making us a good road. Rock creek runs under rocky bluffs composed of material similar to

that making the bluffs on Pole creek. It is a very fine sand mixed with lime and limestones, and, in other instances, mostly made up of gravel from granite rocks; color, a yellowish white. Crossing the creek without difficulty, we kept down its right bank for about a mile, and then crossing a small spring branch coming from the bluff, we made our camp on the bank of the main stream. The bottom of this stream is well supplied with excellent grass. Fuel very scarce indeed; mostly buffalo chips.

*Saturday, September 20, 1856.*—To-day marched down the creek for seven miles, when, meeting quite a large party of Cheyenne Indians, and the sky threatening rain or snow, we turned into the creek and made our camp. Our way lay along the creek bottom under the bluffs, and was mostly a good road for wagons; as it was over a large lodge trail. A little cutting was requisite here and there, but not much. The bluffs in one or two places came close to the creek, which is very tortuous in its course. Once or twice we thought of taking the high prairie, but, on inspecting the surface, it was found to be so cut up with deep ravines as to deter us. The Cheyennes whom we met were at first disposed to proceed to hostilities; some of them, in fact, had formed part of the band which was attacked by Captain Stuart a short time before. On discovering the strength of the party, however, and that it was prepared to receive them, they concluded to be friends. They were not allowed to enter the camp, the commander of the escort, Major Armistead, stationing sentinels to prevent them. At half past ten o'clock a cold steady rain set in, which lasted nearly forty-eight hours, making our situation extremely disagreeable, as there was no fuel but buffalo chips, which cannot be used during wet weather. The bluffs on this creek, so far, are almost entirely confined to the right bank of the creek, only rolling hills appearing on the other side, of various degrees of steepness. Stone in these bluffs is composed of fine sand, lime, and coarse gravel, and is very friable.

*Sunday, September 21, 1856.*—Remained in camp.

*Monday, September 22.*—Still keeping the right bank, we found an excellent smooth road all along the bottom. At the end of about nine miles we arrived at the junction of Rock creek with the Arickaree fork of the Republican. Made our camp about a mile below the junction of the two streams, having crossed Rock creek and found a convenient place on the left bank of the stream, resulting from the junction of these two. Road to-day very good and smooth. A few miles from camp this morning the rock bluffs ceased on our right, and undulating hills appeared on both sides of the creek. The grass on Rock creek is abundant. The stream widens to quite a river, much resembling the Platte both in its bed and in its bottom. No fuel to be found, except a little drift-wood, which we secured at the mouth of Rock creek; soil sandy. After crossing Rock creek, and for some time before, the hills on the left bank became high and more abrupt and precipitous. They were entirely of sand, with a thin covering of grass.

*Tuesday, September 23, 1856.*—Left camp this morning in a very heavy fog, and crossed the river (the Arickaree fork) within half a mile. The bottom was soft from recent rains, but nevertheless easily



passable. Route to-day lay along the bottom of the Arickaree fork, which afforded excellent ground to travel over. Occasionally our progress would be retarded by one of those deep ravines, with almost vertical banks, which are so common in this country. It was necessary to expend two or three hours of labor in cutting and grading the banks at each of these places. These ravines could not be avoided by crossing the river, as it is at this place, and in fact throughout nearly its whole extent, of a quicksand bottom. Even individuals found it difficult to get single animals across without bogging in it. On the left bank of the river rough looking sand hills come close down to the water's edge. They are also to our right, on the right bank of the stream, and would no doubt be very difficult to pass over. The secondary bottom of the stream affords a much better locality for a road. There are traces here and there of wagons, probably those of traders with the Indians who spend the summer on the Republican. The soil passed over to-day seems to be of sand, and at intervals the water cuts ravines with precipitous banks, which always require more or less labor before trains can pass.

*Wednesday, September 24, 1856.*—To-day we had a very easy march for twelve miles along the bottom of the Arickaree fork. The route lay mostly over very smooth, level ground, avoiding the sand hills to our right. This bottom was, in places, very soft from recent rains, but in dry weather is easily passable. The hills are not to be thought of for a road, as on both sides of the river they are rugged and irregular, and composed almost entirely of loose sand. Arrived at 11 o'clock at the Republican fork, which we crossed without difficulty, although we had feared it would prove miry and full of quicksands. To-day the first clump of timber was seen which has appeared since we left the Platte; it was on the Republican fork, and to the right of our crossing. Camped at the crossing of the Republican.

*Thursday, September 25, 1856.*—Continuing over a range of barren sand hills, we found ourselves, at the end of half a mile, in the bottom of the Republican, which gave us an excellent travelling ground; here and there, as usual, it was necessary to grade the bank of a ravine before crossing, but nothing more serious impeded us. Timber appeared in clumps to-day, both on the right and left bank of the river; these were always in hollows. At 11 o'clock a creek was crossed, which had a good deal of drift-wood scattered on its banks, indicating a supply of timber near its head; indeed, a quantity could be seen from the point where we crossed it. It is called by the Indians Big Timber creek. A few miles further we crossed a spur of the sand hills, and, entering a wide, grassy bottom, camped near a grove of cotton woods, which furnished an abundance of dry fuel.

The sand bluffs just below this camp came close into the river, and nearly 100 feet in height. The whole country on both sides of the river appears to be confused and broken masses of sand hills, composed of pure sand of various degrees of coarseness, and seemingly only retained in place by its covering of grass; even this is wanting in some spots, and the pure white sand appears. Being loose, it is excessively annoying to travellers when the wind blows, being then raised in clouds. The river bottom, as far as we can judge from what

we have seen, offers the only location for a road. To-day we have again reached the region of game, buffalo and antelope having been killed. As we descend the river the country seems to lose something of the desolate character which has marked it since we left the Platte.

*Friday, September 26, 1856.*—Continuing our march through the grove of cotton-woods, at the end of half a mile, we mounted a ridge, which ran parallel to the bluffs, and thus passed the bend of the river without difficulty. This bend we feared would force us to cross the river—an operation of some danger and difficulty, as the quicksands are numerous. Having passed the bend, we marched for one or two miles through rough sand hill, which fatigued and wearied our animals no little. Leaving the sand hills, the river bottom gave us a smooth, hard road. This bottom was well covered with grass, and had a gentle inclination to the river. On the stream and on the creeks coming in on the left bank there was plenty of cotton-wood timber. Here might be made a camp for several companies of cavalry for some weeks, as wood, grass, and water are all convenient, and this point is, moreover, the furthest west on the river where these three requisites are found. It is, too, in the very home of the Cheyennes, who claim this valley as their particular hunting ground, and threaten to prevent the whites from passing along the river. Buffaloes were seen in abundance to-day. Passing over more creeks, which again caused delay in preparing its banks, a few miles over a very level country brought us to our camp on the river, where we found plenty of good grass and fuel.

*Saturday, September 27, 1856.*—To-day a march of thirteen and a half miles brought us to our camp; country smooth; occasionally a gully or ravine would delay us for a short time. The landscape improves visibly as we descend the river. More clay appears in the soil than previously. Several wooded gullies appear on the other side of the river. About three miles from camp a large creek with treeless banks appeared on the other side of the river. On examination it was found to contain more water than the Republican itself; this led us to suppose that this might be the Frenchman's fork, or Viho Mappy of the Indians. Camped at 12 o'clock above the mouth of a creek coming in on the north side of the river. Its banks were heavily timbered with elm, ash, hickory, &c.

*Sunday, September 28, 1856.*—Train remained to-day in camp. Examined to-day the large creek on the north side of the Republican, and found it larger and deeper than the Republican itself. No trees are near its mouth, but clumps of cotton-woods appear five or six miles further up. Several smaller streams came into it from above. At fifteen miles from its mouth are the forks. These, according to an Indian guide, rise about thirty-five miles from the Platte, at the mouth of Pole creek. An Indian trail runs along this stream, and from its head over to the Platte, touching in the interval at several water holes. The soil along the banks of this stream is sandy; few trees appear. Fuel consists mostly of buffalo chips.

*Monday, September 29, 1856.*—Still keeping the right bank of the Republican, we reached, at 11 o'clock, the creek (Beaver) with very deep cut and vertical banks, and well wooded. Several hours being

necessary to prepare a crossing, we camped on the river, near the mouth of this creek. Near the mouth the banks were soft and water deep; at the crossing there was little or no water. About halfway of to-day's march, the Indian trail followed by us ran into the river. At this point the river was close in under the bluffs, not leaving room for a wagon road at the bottom, thus forcing us to cross the stream or to pass over the hills. We took the latter alternative, after examining the river and finding the bottom too soft and miry to trust to. Some cutting was necessary in one or two places, and the route over the hills and heading deep hollows was circuitous, with several ascents and descents; but there was little of it. Passing this place, we struck on to the broad prairie, which continued to the creek, near which we encamped.

*Tuesday, September 30, 1856.*—Crossing the creek this morning, our way still lay on the right bank of the river, which affords us an excellent hard road. At 10 o'clock, having a creek with steep banks in front, the route inclined a little to the left, so as to cross lower down where the banks were not so high, and so, for a short time, left the secondary plateaux for the river bottom. Probably the detour may be avoided at the expense of some cutting. At 12 o'clock we reached a point where the river runs close under vertical bluffs; this forced us to cross the hills. The detour thus made was about four miles, and brought us to the river about two miles below where we left it. Our camp to-day was pitched in a small nook in the hills, where we were very much crowded. Grass very poor and scarce. The hills and rough ground now appear to keep close on the right bank of the river. Hitherto they have been confined mostly to the left bank, leaving excellent country for a road on the right bank.

*Wednesday, October 1, 1856.*—This morning we crossed the river immediately at the camp, and marched for six or seven miles along the left bank to our camp on the bank of a creek. The river had here a hard, fine bottom, and we crossed without difficulty, the water at this time reaching only to the axletrees of the wagons. We were compelled to cross at this point, as our Delaware guides report that the bluffs now mostly are on the right bank, and that the face of the country is generally rough. The bottoms, or smooth, level grounds, are now to be found on the left bank. The hills slope away gradually from the river. The creeks which we passed yesterday, and the one crossed to-day, are reported by the Delaware guides as long streams, well wooded, and with running water. They head within fifteen miles of the Platte, and a supply of wood and water for a route from the one to the other of these two streams. The creek called Beaver creek by the Delawares, and which is supposed to be identical with the Prairie Dog creek of Colonel Frémont, is also a very long stream, taking its rise very near to the "Point of Rocks."

*Thursday, October 2, 1857.*—Made to-day ten miles down the left bank of the Republican, over an excellent country for a road. At eight miles from camp arrived at the banks of a large creek; water about three feet in depth and twenty feet in width. It is reported to be a very long stream, having plenty of timber on its banks. It rises very near to the Platte river. To-day both sides of the Republican

offer smooth country for a road. For the last four days our progress has been much retarded by the almost total absence of grass, a want which tells seriously on our animals. The soil is good and produces abundantly, but the number of buffaloes which have pastured here during the summer have left very little for the animals of travellers.

*Friday, October 3, 1856.*—Continued our way down the Republican; country same as yesterday; grass everywhere eaten off by buffaloes. The soil is good, and in many places thickly covered by large sunflower plants. Passed, about the middle of to-day's march, a deep creek, which cost about two hours' labor to prepare for crossing. It was called "Parsnip creek," from the quantities of that vegetable growing wild on its banks. Striking from this crossing into the river, we found a sandy soil and no grass; afterwards a good camp was found at a spring branch running into a creek where there was a sufficiency of grass for our train. The party examining the right bank of the river report a very rough country, which forced them to keep some distance from the stream—a very serious difficulty, as most of the subsistence for our animals lies on the river.

The character of the Republican continues the same as it has been described for the last three or four days up to the point where we left it to cross over to the Platte on our outward route. It is, for the most part, a wide, level bottom, lying generally considerably higher than the river. It is intersected by many creeks, which are deeply cut and have very steep banks. These occur, sometimes, every mile or two; sometimes every three or four miles. The banks are generally well wooded with ash, elder, box elder, &c. From their number and the steepness of their banks we were much retarded in our march. Almost all of them required an hour's labor to prepare their banks for crossing, and some of them two and three hours.

The bottoms on this river afford subsistence to immense herds of buffaloes and elks. The Cheyennes, Comanches, and Kiowahs make it their favorite hunting ground, and on that account have repeatedly expressed their intention of preventing the making of any road along the river. I suppose it would, therefore, be necessary to overawe them by posts, in case a route was laid out along this valley, as they would stop trains and rob them, if they did no worse. Fortunately, the nature of the country is such that many favorable points for the location of posts may be found, and the fertility of the soil would very soon attract settlers, if they were once assured of protection. As compared with the valley of the Platte, this valley is much superior, either for the establishment of posts or settlements. The Platte valley furnishes no wood for fuel or for building, and no cultivable soil. The creeks which run into the Republican are numerous, and the banks of all of them are well timbered with hard woods. The bottom, also, at many points, is of great fertility.

On the 8th of October I left the main body of the train, taking with me a party for the reconnoissance of the Solomon's fork of Kaw river and the country between it and the Republican. After my departure the reconnoissance and survey were carried on by Mr. John Lambert. Upon him, also, devolved the reconnoissance and survey

of a route along Pawnee creek, from the Platte to the Black hills, and of one along Crow creek, from the Black hills to the Platte.

*Report of the reconnoissance of the country along Solomon's fork, and of that between Solomon's fork and the Republican.*

On the 8th of October I left the train with a party of men provided with pack-mules for the transportation of the provisions, &c. We crossed the river a little below our camp of the 8th. The water was about 18 inches deep, and bottom firm. We made, by estimate, 22½ miles over a high rolling prairie; soil was generally good and covered with curly buffalo grass. At ten miles from the Republican crossed a large creek called by the Delawares Beaver creek; it was about three feet deep and twenty feet wide. The water resembled that of the Republican in color and taste; banks steep and of clay. Leaving this, we kept on for 12 miles, over similar country, to Wolf's creek, where we camped; wood, grass and water convenient.

*Thursday, October 9, 1856.*—Travelling, this morning, over the same high rolling country, we came, in 8 or 12 miles, to the banks of a creek, a tributary of Solomon's fork. Crossing this creek, we followed the right bank, over a level bottom, for ten miles further. Crossing then, we made our camp at the end of 19½ miles of travel. The country passed over to-day is a good deal cut up by water; buffalo grass covers it. Limestone appears in several places cropping out, and, where the ground is cut, beds of shell and fragments of limestone are seen. The soil contains a good deal of clay, and in the hollows are seen strata of blue clay indurated.

*Friday, October 10, 1856.*—Remained to-day in camp, detained by a storm of wind and rain.

*Saturday, October 11, 1856.*—Left our camp to-day at 1 o'clock, and kept our way for about ten miles, to camp on the left bank of the creek whose course we had been following. The country is very favorable for a road, the only obstacles being occasionally a creek with precipitous banks. These are easily crossed, though, after a little labor. The country is still high prairies, covered with a short buffalo grass, which is eagerly eaten by our animals.

*Sunday, October 12, 1856.*—Our route to-day is still over the same kind of country, crossing many of the affluents of the creek which we are following. These affluents are all of the same character, the beds lying very deep, banks very steep, and now, from recent rains, very slippery to descend and ascend. The soil contains much clay. A good deal of labor must be expended at these crossings to make a good road for wagons; but these places are the only obstacles presented. Camped on Solomon's fork, about three miles below the mouth of the creek which we had followed during the day. Solomon's fork was for a long distance with high bluffs on its right bank; on the left, wide bottoms, covered with the red top grass, affording excellent pasturage to the immense herds of buffaloes which frequent this stream. The banks where we touched the river, beyond camping, are very high, almost vertical, and much worn by water.

*Monday, October 13, 1856.*—Detained in camp by rainy weather.



*Tuesday, October 14, 1856.*—Continued our way down the left bank of the river, keeping generally on the level, lying between what is called the river bottom and the hills. This gives an excellent location for a road, the only obstacles being the numerous creeks which are met with at distances from each other of from three to five miles. Camped at 3 o'clock, being well provided with excellent grass.

*Wednesday, October 15, 1856.*—Getting out of camp this morning, we left the hills behind us covered with buffaloes. Strata of fossiliferous limestone appeared on the crests of these hills. As we descend the river, the face of the country improves vastly; broad bottoms appear covered with a luxuriant growth; the soil is of a rich black mould, covered with a thick growth, in places, of large sunflower plants. Many creeks were passed to-day, whose banks were heavily timbered with oak, ash, elm, and other hard woods. Occasionally we distinguished creeks coming in on the other side of the river, though, from our distance from the river, no doubt many escaped our observation. The country to-day has been very beautiful and fertile, resembling much that lying about the Pottawatomie Mission in eastern Kansas. Buffaloes are so abundant that no notice is taken of them, except when it is necessary to kill one for a supply of fresh meat.

*Thursday, October 16, 1856.*—The country travelled to-day continues of the same character as yesterday, wide fertile bottoms intersected by deep lying creeks; the bottoms are covered with red grass, as yet not touched by buffaloes. The bluffs on this side of the river have sunk to mere swells, well covered with grass. On the other side they are precipitous and close to the river, rendering that side unfavorable for the location of a road. Several bands of antelopes appeared to-day, but they were not molested, as there was plenty of fresh meat in the camp. Camped to-day at 3 o'clock in a fine bottom, well protected from the wind and easy of access to the water.

*Friday, October 17, 1856.*—Travelling through the same kind of country as yesterday, and still along the left bank, we camped at 3 o'clock. Except at one point, where they come close to the river, the bluffs have sunk to mere swells in the prairie. On the other side they are still at times precipitous, and close to the river.

*Saturday, October 18, 1856.*—Keeping our course still down the river and over the same wide and well grassed bottoms, we arrived at one o'clock at the point of junction of this river with the Kaw, having first crossed the road made last year from Fort Riley to the Arkansas river, and thus terminated this reconnoissance. For some miles back the grass has appeared burnt up, and encampments must be sought close to the river's edge for the sake of the animals. The banks of the Solomon's fork are generally very high and precipitous, and it is only at certain points that encampments can be made conveniently, on account of the difficulty of watering the animals of a party. The left bank of the river presents many favorable circumstances for the making of a road and many inducements for settlements. The face of the country is favorable; soil fertile and hard; grass and water in abundance, and of good quality. The only obstacles to the passage of wagons are the numerous deep cut creeks with precipitous banks. A pioneer party, however, for any train would very soon make them

easily passable, as very little is needed beyond a little cutting and filling.

Having reached the road made last year, I proceeded between, as far as Kaw river, to examine and inspect the bridges built during the summer over the following streams: the Kaw river, Saline fork, Solomon's fork, Armistead's creek, and Sycamore creek. The party then returned to Fort Riley, where it arrived on the 24th of the month. The party left on the Republican not having arrived, I was obliged to wait till the 1st of November for their appearance. The next day we took up our line of march for Fort Leavenworth, where we arrived on the 7th of the month. The party was then discharged, except such as were needed for office work, and care of animals and property. The material belonging to the survey was carefully packed away in the quartermaster's store-rooms, and the animals left to recruit for service during the ensuing summer.

In considering the several routes that might be followed from Fort Riley to Bridger's pass, I think, having in view the smallness of the appropriation now available for the road, that the route followed in the outward journey presents the greatest claim to be adopted. In its favor are to be mentioned the following facts: It is well supplied with running water throughout its whole extent—first the Republican, then the creeks between the Republican and the Platte; this section is over entirely new ground. From the point where the Platte is touched to the Laramie crossing, the road is already made, and it is an excellent hard road, well supplied with water and grass by the Platte. From the Laramie crossing to the head of Pole creek, the supply of good water is constant. The grass is generally short, as on all of the uplands, though there are spots occasionally met with where a more liberal supply than usual may be had. From the head of Pole creek over to the west fork of Laramie no obstacle of any sort is presented, and the streams furnish abundance of grass and water. From the west fork of Laramie river to Bridger's pass there is but one route to be followed; and, it has already been described, as I need not speak of it again here. The great objection to locating a road over the ground just described is the total want of fuel, by buffalo chips being all that can be expected from Fort Kearney to the Pine Bluffs, near the head of Pole creek, a distance of about 300 miles. The absence of timber and the inapplicability of the soil to purposes of agriculture, prevent the establishment of posts and the settlement of the country along the Platte. This absence of timber, and consequently of fuel and shelter, must always make the travelling along the Platte in the winter hazardous and painful, especially as there are no posts or settlements whereat assistance might be obtained when needed.

The route along the Republican up to the head of Rock creek, and thence over to the South Platte and up Cache la Poudre creek to Laramie Plains, is, in many respects, more favorable than the one just spoken of. For more than 200 miles up the Republican, the soil is fertile, and there are numberless creeks, the banks of which, being wooded, furnish timber and fuel. No obstacle is presented to the passage of wagons, except by the steep banks of these river streams;



settlements are already formed some distance out from Fort Riley, and these will rapidly extend, as the country becomes known, especially if protection should be extended to them by posts, or otherwise.

The portion of this route which lies along the South Platte is destitute of fuel, resembling much the route along the main Platte. The part lying along the Cache'la Poudre and its branches passes over a country somewhat rough, but supplied with fuel and grass, and water, and convenient spots where parties could be sheltered from storms in the winter time. The strongest and only objection to this route is the desert sandy country that must be crossed in passing from the Republican to the Platte. This space is almost 60 miles in width, and may be said to be destitute of fuel, water, and grass, so little of any of these requisites is to be had. In passing over this track coming from the westward, we made two marches of twelve and thirteen miles for the first two days, camping at spots which could scarcely be said to be reliable for water for a road that should be travelled by large trains, and repeatedly during the same season. The third march was of thirty-five miles, to the head of a branch running into Rock creek. Several points were passed where there was a little water, but not enough for a large party, and what there was did not seem to be permanent. It is very possible that other and more extended reconnoissances over this tract of country may result in discovering other supplies of water, and a better route than that followed by my party. But with the information now in my possession, I could not recommend this one as the proper one for the location of a permanent road.

After leaving Fort Riley, information was obtained concerning the Republican and some of its larger branches, which were not previously known to exist, which makes it probable that other routes than the two spoken of above may be found from Fort Riley to Bridger's pass, which would possess advantages over those travelled during the last summer by us. It is thought that a very good and direct road might be had along the Republican as far as the mouth of the Viho Mappy, or French fork; then following the French fork to its head, to cross the divide by an Indian trail, leading by water holes, to the Platte. But as this route has not as yet been reconnoitered, I cannot speak advisedly of its merits. The probability that the valley of Solomon's fork might furnish a good location for a road, joined to the fact that there was no information existing as to the character of the country through which this stream flowed, induced the reconnoissance of that region. In its soil, face of the country, and general advantages, it very much resembles the valley of the Republican. It is not more in a direct line between the two termini of the road than the Republican; and, after leaving the head of the stream, the route would be subject to the disadvantages which have been indicated as existing with regard to the route along the upper Republican and the French forks.

Barometrical observations were made throughout the expedition; they are now in process of computation. The approximate altitudes given by some of those computations for certain points are as follows:

Fort Riley.....	1,180 feet.
Fort Kearney.....	2,250 "
Mouth of Pole creek.....	3,750 "
Black hills, near head of Pole creek.....	8,480 "
Dividing ridge.....	8,680 "
Crossing of North Platte.....	6,900 "
Camps 45 and 47, on Sage creek.....	7,500 "
Camp 46, Muddy creek.....	7,330 "
Ridge north of the pass.....	8,400 "
Camp 56, Black hills.....	8,180 "
Mouth of Crow creek.....	4,800 "
Camp 67, South Platte.....	4,200 "
Plateau, between Platte and Republican, 4,500 to.....	4,700 "
Camp 72, Rock creek.....	3,340 "
Pass in mountains.....	7,700 "

It will be seen that the altitudes of the pass through the mountains is very much the same as that given by Colonel Frémont for the South pass. The altitudes for the South pass from Frémont 7,400 feet. In passing over the Black hills, altitudes considerably greater are obtained.

During the ensuing summer I propose to go over the route from Fort Riley to Bridger's pass, and work such portions of it as may need improvement, and put up such temporary bridges as may be necessary, so far as the appropriation may extend. I am inclined to think that a route along the Republican river, as far as the mouth of French fork, and thence up to its head, and then over to the plateau, would be most direct; but, as before remarked, this country needs examination before anything can be positively stated as to its merits. Until last summer, the existence of the French Fork was known only to a few traders and trappers, and no mention has hitherto been made of several large streams emptying into the Republican on its north side. The whole of the western portion of Kansas is almost completely unknown, and should be examined as speedily as possible. The reconnoissance and survey of last summer made known a kind of country and numberless streams that were not supposed to exist. In my opinion, the residue of the appropriation for this road could not be better employed than in the reconnoissance of the large streams flowing into the Republican, the head waters of the Republican itself, and the large stream flowing into the Kaw river, called the Saline fork. All of that country is almost completely unknown, and, from my experience of last summer, I think it very probable that it is much better than it is generally supposed to be.

The exploration proposed would at least make known whatever resources might exist. The creeks, according to our Delaware guides and others, are large and better wooded than the main streams themselves. The road between Fort Riley and Bridger's pass, as it now stands, is practicable in every part for wagons, as is shown by the fact that a train of thirty-three wagons was taken over it last summer. I would call the attention of the department to the fact, how-

ever, that the road leads through a pass in the mountains, and there suddenly stops. To make the work already done, and to be done, on the road to the east of the pass, available for any purpose, the road should be continued to some post or station where it might be connected with other roads. As it at present stands it leads only to the heart of the mountains. Many parts of this road lie over prairie, and require only use to become well marked; some points require working. The whole work would be best done by the passage of a large train, supplied with its own pioneers, and the track would be made indelible for some years at least. In the mountains some places are passed over that no amount of labor within the command of the appropriation would render good road, still they may be easily passed with ordinary care on the part of the teamsters. On those parts of this road which lie over prairies the trace would soon be obliterated by successive crops of grass and the fires which generally sweep over them at least once in the year. The track on such country can only be preserved by immediate use; if not used shortly after being made, a guide would be necessary for every train attempting to travel over the same ground.

Along with this report I have the honor to forward the report of Mr. Henry Engelmann, geologist; also, the report of Mr. John Lambert, on the topography of the country on Pawnee creek and Crow creek and its branches.

I am, sir, very respectfully, your obedient servant,

FRANCIS T. BRYAN,  
*Lieut. Top. Engineers.*

Colonel J. J. ABERT,  
*Chief Corps Top. Engineers, U. S. A.*

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*Report on the topography of the country between Lodge Pole creek, Cache la Poudre, and the South Platte, in connexion with an exploration for a road from Fort Riley to Bridger's Pass, by John Lambert, topographer.*

ST. LOUIS, *March 21, 1857.*

SIR: I have the honor to submit the following report on the section of country lying between Lodge Pole creek, Cache la Poudre, and the south fork of the Platte, and a section of the valley of the Republican fork of Kansas river, examined by me under your orders, during the summer and fall of last year.

The former section is almost wholly of that generally barren character which marks, more or less, all the great plains so near the central mountains of a continent: creeks mostly dry, streams rising and sinking in the thirsty soil, rarely keeping on the surface for a single mile, little or no timber, poor grass, and most frequently none at all, away from the water courses; immense fields of prickly pear and large tracts of arid, naked soil, producing absolutely nothing; while the highlands between the dry channels of the creeks have, in many cases, a considerable altitude, and sometimes crested with masses

of rugged rock, completing the desolate character of the scene, and proclaiming it a desert waste. Of a district of country where such are the prevailing features no lengthy or minutely detailed report can be required, especially as the leading characteristics are so similar to those of other and greater sections of the tertiary and cretaceous formations, heretofore elaborately reported upon. It will, therefore, be sufficient to indicate the character of the routes explored and their practicability as to the location of roads, with some notice of easily recognized landmarks. The New Mexico and Laramie road runs through this district from the mouth of Crow creek, nearly north, to the crossing of Lodge Pole creek, a distance of about sixty miles. It is the best line of road which can probably be found in the whole district. Crow creek is dry at the mouth, but water may always be found about eleven miles up, where the road crosses, and thence, about twelve miles to the forks, water is always sure, and sufficient wood for fuel; but grass is generally scant and poor, and the high prairie, on either side of the creek, is thickly covered with prickly pear, to the exclusion of any other kind of vegetable life. From the forks of Crow creek to the crossing of the eastern branch is about seventeen miles over a smooth plain, covered somewhat less thickly with prickly pear and a very thin show of grass. There are several muddy ponds in this plain which appear to contain water permanently. The crossing of the east branch of Crow creek affords indifferent camping ground, with water in holes, (sometimes running;) brushwood and poor grass along the margin of the creek. From this point to Muddy creek (a branch of Lodge Pole creek) is fourteen miles, over a wide dry plain, in which the prickly pear almost disappears, but only to give place to extensive dog villages; the latter are not, however, immediately near the road. From Muddy creek to Lodge Pole creek, about five miles, (crossing a small branch less than half way,) the country is high and rolling, presenting many steep inclines. There is no wood of any kind, the only available substitute being the well known "Bois de Vache."

The section of the South Platte, between Lodge Pole creek and Pawnee creek, about sixty miles, is of the usual character of that river, having a wide flat bottom, subject to sudden inundation in rain storms, of which we had some disagreeable experience. Less than half way there is an extensive salt bottom on the north bank, and a remarkable group of rocks appears amongst the bluffs bordering the interval about twenty miles from Lodge Pole creek. At about half of this distance, a bend of the river contains a group of marshy islands covered with willows, and two miles higher up there is a solitary tree. About thirty-seven miles from Lodge Pole creek there is a slough extending a short way from the river and easily passed, and nine miles further is Horse Tail creek, having a running stream; it is subject to heavy floods and is difficult to cross; some miles from the mouth it has some timber and brushwood; thence eleven miles to the mouth of Pawnee creek, which is distinguished by a group of trees, making a very conspicuous landmark in the naked valley of the Platte.

The Pawnee creek was considered worth a reconnoissance, in con-

nexion with a route from the Republican river. It extends up stream about fifty miles in a northwest direction to its source, in a remarkable range of bluffs; about nine miles from the mouth there is a quantity of cotton-wood trees, with a few small patches of grass, enough for small parties. These trees and those at the mouth are the only timber on the whole length of the creek. Water is obtained in holes. Between three and four miles further up, there is a remarkable break in a range of hills running at right angles to the course of the creek; it is called the "Pawnee gap," from the circumstance of some Pawnee Indians, some years ago, having been surrounded on the western bluffs by superior numbers of Sioux, until they were reduced to the last extremity of famishing men. We met a band of Arapahoes at this place, who, on observing us, occupied the western bluffs, while we took a position on the eastern. After some cautious manœuvring and delay, the scouts of both parties met in the middle of the gap and declared themselves friends. The rocks of this gap are a kind of coarse granite, are very steep and rugged, and visible from all the high points along the valley of the creek. Seven or eight miles higher up occur the first forks; the south, or main fork, becomes exceedingly rough, being closely hemmed in by high rugged bluffs; and it becomes necessary to follow the north branch, which affords some grass and water near its head. From the forks to the head of the main branch at the "White Buttes," is about twenty-five miles northwest, over high prairie, partially covered with prickly pear, touching the north branch midway.

The White Buttes are two very curious elevations, between two and three hundred feet high, presenting an appearance often seen in cretaceous regions. They probably owe their shape to the same causes which are assigned for the Mauvaises Terres of the Missouri, namely, denudation by water. On the top of the buttes are several strata of dark colored rocks, surmounting an immense mass of soft, light colored material, something between chalk and clay. The top of the northern butte, seen from the northeast, presents a rude resemblance to a sculptured lion, couchant. They are very conspicuous landmarks, and are seen from nearly all parts of the valley. The soil for some miles round the White Buttes has large spaces entirely bare of grass or weeds, and composed apparently of disintegrated limestone, reflects the glare of the sun with painful intensity. A very copious spring, issuing from a ledge of soft sandstone, was discovered near our camp, north of the buttes, by Mr. G. W. Howard, a young gentleman who accompanied the party, and his name was given to it. From this spring the view of the surrounding country is highly picturesque. The bold outlines and bright colors of the White Buttes make an object that cannot fail to excite an interest in the scenery of the desert, and fill the eye until it rests upon the flowing contour of a distant plateau, where some green slopes and scattered cedars are happily contrasted with rugged bluffs and patches of yellow, sterile soil, relieving the generally dreary aspect of the country.

Nearly the whole of Pawnee creek is a dry channel, except after heavy rains, which make a heavy yellow stream of liquid mud; the highlands on either side are uniformly barren looking and somewhat

cut up with gullies, producing little else than the unfailing prickly pear. A wagon road could be located on the north bank, and keeping along the north fork, but it would always be deficient in natural supplies for any but small parties, and cannot be considered as available in connexion with a route from the Republican river.

From Howard's spring numerous gullies and ravines extend, about four miles up, to a range of high and steep bluffs, forming the eastern edge of a tolerably level plateau, at this part about five miles wide, and thinly covered with grass; its western edge is extremely rocky and steep, bordering the plains of Crow creek, and extending a continuous front northwards to Lodge Pole creek, under the name of the Pine Bluffs, having a considerable quantity of that timber. The bluffs are used by the Indians for the slaughter of buffalo, by driving them over the steepest rocks. Both sides of the plateau would be formidable obstructions to a wagon road if there were no other. Between four and five miles west of the Pine Bluffs, in the broad plain of Crow creek, we found a group of ponds with deep, clear water. I gave them the name of our guide, Curtis. Thence seven or eight miles nearly west, to the intersection of Crow creek with the New Mexico and Laramie road.

From the last camp west of the Black Hills to the crossing of Crow creek just mentioned, the country is not materially different from the regions just described, excepting the first day's march through the charming scenery of the Black Hills. Notwithstanding the varied character of the surface through these hills, a wagon road could be easily located through beautiful little valleys, by rocky toppling bluffs, and grassy streams, and copious springs. The hills in this part are not overloaded with timber, so that fine views open out in every direction; fine springs abound, to one of which my name is affixed. A march of sixteen miles brought us to running water in one of the head branches of Howard's creek, which joins the Platte near the mouth of Cache la Poudre; we followed down this branch to the main fork, about seventeen miles, where running water was again found, but no wood, (some brushwood,) the country, meanwhile, becoming rough and bare, contrasting sadly with the green vistas of the Black Hills; from the main fork, about eighteen miles across a rough, desert plain, to the White Bluffs on the west branch of Crow creek, where is a small quantity of pine timber, with poor grass and running water. The White Bluffs are of the usual character peculiar to this region, and are plainly visible from every part of the Pine Bluffs. A considerable space of rolling country in the last distance stated presents a surface of a bright green color, caused by a thick crop of short green reeds, which usurp the place of grass; small shallow ponds are found in the hollows of the rising ground. From the White Bluffs to New Mexico and Laramie road is about sixteen or seventeen miles, mostly through the prickly pear plain already noticed, completing the reconnoissance from the mouth of Pawnee creek to the Black Hills. It seems unnecessary to make any further remarks on the location of roads in this section of country. The inferior character of the whole region frustrates the principal object of its exploration, as a line of connexion between the Republican river and the passes of the Black Hills; and the re-



connoissance is valuable only as showing this result, for it is most improbable that the exigencies of such a country should ever require lines of road for any other purpose.

The section of the Republican river, from the point where you left it to the bend where it joins the Riley and Kearney road, about one hundred miles, differs from the section above it, reported on by yourself, only in the extraordinary number of creeks which flow into it on the north side; a particular enumeration of them is unnecessary except in a table of distances, unless, indeed, the construction of a road crossing them all were advised, which will hardly be the case while the shorter and smoother route by the Platte is available; and I perceive that their general character, and that of the fine country which they drain, is sufficiently indicated in the conclusion of your own report.

I am, very respectfully, your obedient servant,

JNO. LAMBERT.

Lieut. F. T. BRYAN,

*United States Top. Eng., in charge of exploration.*

*Table of distances on military roads in Kansas and Nebraska.*

From Fort Riley, by Fort Kearney, Platte river, Lodge Pole creek, &c., to Bryan's Pass—		
Running stream (hill road).....		10.35
Madison creek.....	2.18	12.53
Dry Rocky bed.....	8.41	20.94
Miry creek.....	1.27	22.21
Dry Ravine.....	3.06	25.27
Dry Slough.....	1.27	26.54
Dry Bed.....	3.56	30.10
Do. do.....	2.29	32.39
Middleton creek.....	1.77	34.16
Loup creek.....	8.66	42.82
Parson's creek.....	6.62	49.44
Dry Branch.....	2.83	52.27
Do. do.....	2.60	54.87
Up-hill-creek.....	2.30	57.17
Dry Bed, 4 miles; do., 1 mile; do., 1½ mile; Rocky Ford creek, 1½ mile.....	7.75	64.92
Dry Bed, 3 miles; do., with bushes at bend of river, 2½.....	5.90	70.82
La. Sibley, 3 miles; bend of river, 2.60.....	5.60	76.42
Bry Bed, 1½ mile; drain, 2 miles; do., 1½; dry creek, 2½.....	7.80	84.22
Bluffs, 4 miles; dry creeks, 2¾ miles (Crooked creek).....	6.62	90.84
Drain, ½ mile; dry creek, 2¾ miles; drain, ¾ mile; Clear creek, 1½ mile (a remarkable rock in sight).....	5.85	96.69
Bend of river, 4 miles; Cool Spring, at the great bend of Republican river, and point of junction with return route, 2½.....	6.61	103.30
Jenny's creek.....	10.70	114.00
Bryan's Fork.....	8.00	122.00
Woody creek.....	3.00	125.00
Goodale's Branch.....	9.36	134.36
Little Blue river.....	2.25	136.61
Old road and dry branch.....	0.25	136.86
Small stream.....	1.88	138.76
Road leaves Little Blue river.....	10.87	149.63
Water holes, 16 miles; do. 7 miles.....	23.00	172.63
Platte river.....	4.50	177.13



## LIST OF DISTANCES—Continued.

Fort Kearney.....	15.00	192.13
Plumb creek.....	35.00	227.13
Dry Bed.....	48.75	275.88
Cotton-Wood creek and spring.....	1.75	277.63
Dry bed, with bushes.....	3.00	280.63
Fremont's Spring.....	30.82	311.45
O'Fallon's Bluffs.....	2.50	313.95
Tree, on north side of river.....	37.25	351.20
Do. do. do.....	6.25	357.45
Laramie crossing.....	3.00	360.45
Goodale's crossing.....	16.40	376.85
Lodge Pole creek (1 mile from mouth first crossing).....	8.00	384.85
Larned's Spring.....	5.50	390.35
(Numerous dry, sandy and gravelly water courses and ravines in next distance.)		
2d crossing of Lodge Pole creek.....	31.81	422.16
(Some dry branches) steep rocky bluff.....	15.06	437.22
Stream rises in channel of Lodge Pole creek.....	2.00	439.22
3d crossing of Lodge Pole creek.....	3.00	442.22
Heavy sand bed on right bank, and last rocky bluff on left bank.....	6.60	448.82
Stream sinks in channel of Lodge Pole creek.....	1.75	450.57
Dry Branch.....	10.08	460.65
4th crossing of Lodge Pole creek.....	1.66	462.31
(Several small dry beds.)		
5th crossing of Lodge Pole creek.....	6.50	468.81
6th do. do. do.....	0.33	469.14
7th do. do. do.....	1.15	470.29
8th do. do. do.....	0.33	471.62
9th do. do. do. (rocky bluff on right bank).....	0.85	472.47
10th do. do. do.....	2.75	475.22
11th do. do. do.....	3.50	478.72
(Some small dry branches)		
12th crossing at Spring Branch; stream rises in channel of Lodge Pole creek.....	3.75	482.47
Lone Tree, on Lodge Pole creek.....	6.50	488.97
13th crossing of do.....	2.25	491.22
14th do. do. (stream sinks.).....	1.25	492.47
15th do. do. (stream rises.).....	0.50	492.97
16th do. do. (running).....	1.43	494.40
17th do. do. (New Mexico and Laramie road.).....	0.89	495.29
Dry Branch.....	11.25	506.54
Do. do.....	6.00	512.54
Do. do.....	1.00	513.54
Road leaves Lodge Pole creek.....	12.91	526.45
Road touches do. do.....	11.68	538.13
Road enters Black Hills.....	4.00	542.13
Head of Lodge Pole creek (south fork).....	14.78	556.91
Road leaves Black Hills (entering Laramie plains).....	3.00	559.91
Laramie river (east fork).....	6.04	565.95
Laramie river, (west fork,) road joins return route on Stansbury's trail.....	15.10	581.05
Cooper's creek.....	14.57	595.62
(Several dry beds.)		
Running stream.....	7.50	603.12
Do. do.....	1.50	604.62
Do. do.....	0.85	605.47
Do. do.....	2.50	607.97
Fork of roads north and south of Medicine-Bon Butte.....	2.75	610.72

(On road north of Medicine-Bon Butte.)

Running creek.....	3.00	613.72
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LIST OF DISTANCES—Continued.

Medicine-Bon creek.....	5.33	619.05
Branch of do.....	7.12	626.17
Branch of Pass creek.....	5.02	631.19
Pass creek.....	6.91	638.09
Road nearly joins and leaves South road on a hill.....	9.00	647.09
North Fork of Platte river.....	5.50	652.59
1st crossing of Sage creek.....	3.20	655.79
2d do. do.....	10.32	666.11
Branch of Sage creek.....	3.95	670.06
Strikes South road.....	4.00	674.06
Branch of Sage creek.....	0.66	674.72
Do. do.....	2.14	676.86
Do. do.....	0.85	677.71
Summit of Bryan's Pass, on dividing ridge of Rocky mountains.....	3.19	680.90
Camp on Muddy creek.....	686.00	
Distance by the South road.....	688.76	

RETURN ROUTE.

Bryan's Pass to Fort Riley—

Fork of roads; on west fork of Laramie river.....		99.03
East Fork of Laramie river.....	14.32	113.35
Larned's creek (branch of East Laramie river).....	14.00	127.35
Summit of Black Hills.....	7.00	134.34
Branch of Cache la Poudre.....	8.67	143.02
Another do. do.....	6.75	149.37
Crossing of do. do.....	5.00	154.37
Another branch crossing.....	13.12	167.49
Cache la Poudre (main stream).....	1.00	168.49
Do. do. crossing.....	3.25	171.74
Do. do. do.....	10.50	182.24
Road leaves river.....	1.68	183.92
Road touches river.....	12.25	196.17
Dry branch (broad gravel bed).....	8.80	204.97
Crow creek.....	5.86	210.83
Crossing of South Platte.....	0.75	211.58
Bluff, called "Point of Rocks".....	7.00	218.58
Kioway creek (dry sandy bed).....	17.44	236.02
Bijou creek (running; willow and cotton-wood).....	13.64	249.96
Sand creek (dry and sandy).....	9.00	258.66
Beaver creek.....	9.31	267.97
Tree on right bank of river.....	8.76	276.73
Road leaves river.....	5.00	281.73
Water hole.....	6.75	288.48
Pecker's creek (running in places).....	5.70	294.18
Creek, with water in holes.....	5.60	299.78
Dog creek.....	6.44	306.22
Dry creek.....	31.91	338.13
Branch of Rock creek.....	3.00	341.13
Rock creek crossing.....	7.25	348.38
Mouth of Rock creek (joins Arickaree Fork).....	18.47	366.85
Crossing of Republican river, at mouth of Arickaree Fork.....	22.96	389.81
Big Timber creek (running).....	10.79	400.60
Dry creek (with timber).....	9.50	410.10
(Several dry drains.)		
Opposite mouth of Vtho-Mappi, or Frenchman's Fork of Republican.....	18.07	428.17
Bluffs.....	4.00	432.17
De los Muertos creek.....	1.50	433.67
Homan, or Beaver creek crossing.....	3.00	436.67
To river bank and back to crossing.....	2.00	438.67
(Three dry branches, with timber.)		

## LIST OF DISTANCES—Continued.

Road enters Bluffs nearly opposite a heavily wooded creek .....	11. 76	450. 43
Through Bluffs to river crossing .....	3. 63	454. 06
Small stream, with timber .....	1. 00	455. 06
Do. do. with bushes .....	5. 26	460. 32
Slough .....	3. 25	463. 57
Deer creek (large stream, with timber) .....	6. 00	469. 57
Parship creek .....	8. 10	477. 67
Obstinate creek .....	4. 81	482. 48
Easy creek .....	2. 35	484. 83
Dry creek, with timber .....	5. 65	490. 48
Fogie creek .....	3. 33	493. 81
Creek .....	2. 00	495. 81
Dry creek .....	1. 29	497. 10
Black creek .....	3. 15	500. 25
Larned's creek .....	3. 50	503. 75
Kaufman's creek .....	0. 50	504. 25
Drummond's creek .....	1. 25	505. 50
Allen's creek .....	1. 90	507. 40
Pate's creek .....	1. 00	508. 40
Van's creek .....	2. 00	510. 40
Patrick's creek .....	1. 75	512. 17
Dawson's creek .....	2. 58	514. 73
Engelmann's creek .....	7. 82	522. 55
Tom's creek (dry) .....	1. 50	524. 05
Wood's creek .....	2. 17	526. 22
Moon's creek .....	4. 00	530. 22
Morey's creek .....	0. 31	530. 53
Routh's creek .....	3. 20	533. 73
Wade's creek .....	3. 94	537. 67
Pickett's creek .....	0. 50	538. 17
Brown's creek .....	2. 50	540. 67
Bechtel's creek .....	2. 00	542. 47
Carr's creek .....	1. 65	544. 12
Kearney Trail .....	0. 30	544. 42
Guzman's creek .....	1. 30	545. 72
Luchugas creek and Kearney Trail .....	2. 33	548. 05
(Some dry drains.)		
Scott's creek .....	7. 00	555. 05
Tinell's creek .....	4. 00	559. 05
Bend of river and Spring Bluffs .....	4. 15	563. 20
Spring .....	1. 00	564. 20
Golden's creek .....	2. 00	566. 20
Doboy's creek .....	3. 50	569. 70
Dry creek .....	2. 25	571. 95
Hardecker's creek .....	2. 00	573. 95
Keyser's creek .....	1. 82	575. 66
Hughe's creek .....	2. 00	577. 77
Wiley's creek .....	3. 25	581. 12
Dandeleit's creek .....	3. 50	584. 62
Bluff on bend of river and dry creek .....	1. 50	586. 12
Last of 13 dry creeks, at short intervals, with water in holes, and timber occasionally .....	12. 73	598. 85
Outward route at Cool Spring, on Great Bend of Republican river ..	5. 00	603. 85
Fort Riley .....	103. 30	707. 15

*Report of a geological exploration from Fort Leavenworth to Bryan's Pass, made in connexion with the survey of a road from Fort Riley to Bridger's Pass, under command of Lieutenant F. T. Bryan, topographical engineer, 1856, by H. Engelmann, geologist and mining engineer.*

The engineer making a rapid survey of an unknown country can only lay down on his map that which he has seen along the route; and as his map becomes more correct and valuable, the closer he confines himself to that only which came under his immediate observation, so a geologist can only describe the geology of the route, and not of the whole country, for he must observe the greatest care in his conclusions. He generally cannot be satisfied by distant observations, but must visit each spot and locality that he desires to examine; besides, the places where he may get valuable information are frequently far from the road travelled, and only found by continued search and investigations. Since he is unaware what may be revealed to him further on, and what not, he is obliged to take a careful review of every place where there is the slightest indication of something new; and when his time is thus spent without obtaining, perhaps, the results expected, he may be led in his pursuits to localities of more geological interest and importance, where his time will not permit the necessary investigation which should have been bestowed upon them. Thus he is hurried on without being allowed to take a second view of the same object scarcely, besides being greatly restrained by the precautions necessarily exercised in a country infested by hostile and roving Indians. From such a report, therefore, we cannot expect the same results which only a thorough examination of the country would give. In the following pages I have tried to present a condensed statement of the geological character of the country along the route travelled, omitting many of the particulars noted down in my journal, but which I thought would be uninteresting and tiresome by their continued repetition, and which are summed up in the general remarks upon each of the formations. Although the topographical survey did only begin at Fort Riley, I preferred to make the geological observations from Fort Leavenworth, so as to bring the formations examined along the road in connexion with those already surveyed and described in the report of the geological survey of the State of Missouri. I have been careful in my conclusions, and have not made any which I did not think were fully justified. As the country through which we passed had been touched only in a few points by former expeditions, not much was known of its geological character, and the conclusions made from their reports proved not to be altogether correct. The most striking of these inaccuracies, which are apt to mislead the reader, I will point out in the relative instances.

The most interesting fact proved by my observations is the large development of the cretaceous formation in the country on the Upper North Platte river, extending eastwardly to the Black hills, and westwardly, I suppose, near to Fort Bridger. This formation contains strata of coal, and therefore probably includes all before de-

scribed there as tertiary—the jurassic strata mentioned by Colonel Frémont, quite near the locality examined by me, and a part of that described as belonging to the carboniferous period. In consequence of these mineral deposits the knowledge of this formation is of great importance. Cretaceous strata have been formed, too, in some places in the eastern slope of the Black hills, but of triassic and jurassic strata nothing has been seen.

For the careful examination of the fossils I am under obligations to the most able paleontologist, Dr. B. F. Shumard, of St. Louis, Missouri, whose catalogue of the fossils is subjoined. The chemical analyses most necessarily required were made by myself. The short time allowed for that purpose has, however, compelled me to determine the main constituents only of the examined substances. The practical or economical part of the geology, treating of the useful minerals, the building materials, and the properties of the soil, I have not united in one chapter, but have spoken of them in connexion with each formation, as it seemed to me most convenient to mention the contents and properties of the rocks where I described them.

The formations found along the route were the following:

1. The coal measures, forming the continuation of the coal measures of Missouri, and extending as far as 32 miles beyond Fort Riley.
2. A sandstone formation, exposed for about 48 miles in the bluffs of the Republican river, followed and overlaid by—
3. The cretaceous rocks which were seen on the Republican from 75 miles above Fort Riley to at least 175 miles above that place, and between the Republican and Little Blue rivers.
4. The quarternary, or drift deposits, occupying the whole country between the boundaries of the cretaceous formation and the Rocky mountains.
5. Granite syenites forming the Black hills. Their slopes were covered with—
6. Altered sandstones and limestones of the paleozoic period, heaved up by the igneous rocks. Only near Cache la Poudre creek the eastern slope of the Black hills showed cretaceous strata.
7. The metamorphic rocks of the Medicine Bon mountains, with some decidedly paleozoic rocks on their slope.
8. The western cretaceous formation, with strata of brown coal, occupying the country along the Medicine Bon mountains, and extending westwardly across the upper North Platte river, and the divide between the water of both oceans.

#### *The coal measures.*

The coal measures were found all along the road from Fort Leavenworth to Fort Riley, and further up the Republican fork for 32 miles, the last place where this formation was seen being the bluffs near camp 4. They are the continuation of the coal measures so largely developed in the State of Missouri, described in the geological reports of that State. They are made up of limestone and argillaceous shoals of various descriptions, interstratified with a few slates and sandstones. The nearly horizontal stratification, the softness of most of the rocks,

the configuration of the country along the road being that of a rolling prairie, or slightly broken, all united to make good sections of the strata scarce, the clays and surface soil covering the outcrops of the harder rocks. I therefore cannot attempt to give a complete section of this formation, but I only shall state what rocks I found at different localities.

In the bluffs of the Missouri river, at Fort Leavenworth, those strata are exposed which, in the geological report of the State of Missouri, are described as the upper series of the coal measures. The only rocks seen thence, for many miles, are here and there a belt of tumbling rocks near the top of the hills, showing the outcrop of some strata of limestones. Some are gray, and have a sub-crystalline, splintery, conchoidal fracture, and others are dark brown, ferruginous, and very hard, with an uneven fracture. Being full of organic remains, they show many spatic particles. I observed stems of crinoides, gasteropodes, corales, brachiopodes, and especially a great many of the *fusulina cylindrica*, but the rock is too hard to get out any perfect specimens. Other rocks near by were light colored, whitish-gray, with an uneven fracture, changing into sub-crystalline, and splintery. They gave a sharp, ringing sound under the hammer, and were somewhat fetid from the accumulation of organic remains. These rocks are the upper strata of the coal measures of Missouri, and were noticed between Fort Leavenworth and Stranger creek, on Grasshopper creek, near Silver lake, and between the latter place and St. Mary's mission, in the reservation of the Pottawattomie Indians. The fossils that could be identified, were *spirifer planoconvexa*, *spirifer Kentuckensis*, and *fusulina cylindrica*. The few other strata I found exposed were: On Stranger creek, argillaceous shales, very free of sand, dissolving into a plastic clay; some bluish-gray, some yellowish, and others more slaty. Then, near Grasshopper creek, a yellow, micaceous, friable sandstone, as found in the bluffs of the Missouri river, in the upper strata of the coal measures. Some miles further west, on Rock creek, a small section of strata of the same formation was observed. There was a very compact, dark bluish-gray limestone, with an uneven or splintery fracture, and small crystalline, from such an abundance of fossils that they obliterate one another. There were a few gasteropodes, bryozoa, but especially many brachiopodes, *productus splindeus*, *productus subrascensis*, *chonetis Smithii*, *spirifer mensebachanus*, *rhyconella atrypa*, and of *acephala*, *arca*, *avicula*, and *mytilus*. Above these limestones, argillaceous slates were exposed, thinly laminated, of dark bluish-gray color, not unlike roofing slates, but much softer. Some miles beyond Mud creek was a similar section; some feet of thinly laminated bluish slate, overlaying a light colored grayish and whitish hard limestone, with an uneven fracture, in thin layers, wholly made up of fossils, especially *fusulina* and brachiopodes, interstratified with seams of slate. There were recognized *productus villiersi*, *productus nelrascensis*, *octhisina umbraculum*. In the slates was a large, flat, very thin and fragile shell, which, however, could not be preserved. The rolling prairie in some places was covered with boulders; most of them were quartz rock, of a fine red color, with a splintery fracture, very

hard, and of considerable size. I found them to be sandstones and conglomerates of quartz, sand, and pebbles, thoroughly cemented by silex, and probably metamorphic, at least they all looked as if the quartz had been exposed to heat. With them I found pieces of granites and seyenites of various descriptions, generally imbedded in the sand. They are specimens of drift formation, and found in many places of the Mississippi and Missouri valley. Near St. Mary's mission, there was a change in the aspect of the country, partly because the road, leaving the high prairie, comes nearer to the Kansas river, the waters of which have cut a wide and deep channel in the rocks, and partly by a change in the nature of the rocks themselves, the hills here being steeper, and generally more rough and rocky, the harder layers forming projecting steps which could not be obliterated by the softer materials. Nearer to Fort Riley this is still more developed, the rocks having the same horizontal stratification; but other lithological characters are, as the fossils prove, of the same formation. Two miles east of Lost creek I observed the following section:

a. The top of the hill was formed by an impure gray limestone, with a whitish surface. It was granular or oolitic by an abundance of small organic bodies.

b. A little lower down the stone lost its uniform organic structure, and showed a more uneven than granular fracture, and stems of crinoides, bryozoa, &c.

c. Then came similar limestones, yet less granular, more compact, and without fossils.

d. Lower down there was a layer of light gray limestone, with an uneven and fine-grained fracture. It was very compact, and separated in thin slabs.

e. Much of a highly silicious limestone. The upper part was the hardest, with cherry pieces, yellow and grayish, somewhat porous uneven, granular. Lower down it seemed to be a highly ferruginous, silicious, very hard, yet somewhat porous limestone, with no distinct signs of fossils.

f. Then followed layers of a light colored, yellowish gray limestone, with an uneven fine granular fracture, and many spatic particles from fossils, whose surface, exposed to the influence of the atmosphere, showed stems and arms of crinoides and other fossils. Indeed, this stone is nearly composed of them.

g. At the foot of the hill there was a limestone, which looked like an impure, yellowish sandstone. It had an uneven fine granular, brownish fracture, in many places small crystalline by the large amount of fossils, remains of which it is composed. It is not quite unlike the former. Slates and shales, or other softer materials, seemed to partake of the formation of the hills, but were not exposed, and some loose pieces of sandstone were found apparently not far out of position. Of fossils, only *orthisina umbraculum* could be identified, and another stratum on Lost creek was quite made up of *Myalina subquadrata*. I noticed, too, the characteristic spinæ of some echinodermata of the paleozoic period.

In the banks of Little Vermillion creek, three miles west of Lost



creek, sandy shales, with ferruginous and silicious concretions and iron pyrites, were exposed, and below them a light-gray micaceous friable sandstone. Further on this sandstone had been found in digging wells, and a limestone quite made up of *fusulina cylindrica*, light colored, with ferruginous sections of the outside of these fossils much resembling some rocks from Grasshopper creek. On another creek, in a highly fossiliferous limestone, were noticed many stems of *crinoides*, *fusulina*, some *gasteropodes*, *brachiopodes*, and *acephala*. There were identified *productus prattinianus*, *productus splendens*, *productus semireticulatus*, and *pecten occidentalis*.

On the mouth of Big Blue river the top of the bluffs was formed by layers of a limestone with a whitish worn outside, hard and silicious, with an uneven, fine-grained, dull yellowish fracture, and many small holes. I found in it only some few columns of *crinoides* and *fusulina*; but most of the holes had the shape of the latter, and the rock seemed, therefore, once to have been full of them. The lower strata are less silicious, and actually contain many *fusulina* and signs of *crinoides*, *brachiopodes*, and *bryozoa*. The lithological character of the rocks near Blue river is very near the same as that of the last carboniferous limestones west of Fort Riley, and the strata noticed on the road to that place were similar. On Wild Cat creek, *myalina subquadrata* was found. Three miles east of Riley a limestone was quarried with an uneven, fine, granular whitish fracture, and many indications of organic remains, interstratified with nodules of flint; and near the fort are some prominent strata of a similar character, from which an excellent building stone is taken. It is a light buff-colored, fine-looking, somewhat chalky limestone, with an uneven, fine granular fracture, and without any signs of crystallization, except in the sections of fossils. Though porous like a tufa, it is strong, and gives a sharp, ringing sound under the hammer. The layers are split into large square pieces which are easily dressed. The upper portion is much more fossiliferous, and, therefore, more small, crystalline, and less chalky. Below these strata similar, but coarser, limestones were noticed; also flint and some sub-crystalline layers, interstratified with slates and argillaceous shales. Above the rocks described, there was also observed a layer of gray limestone, compact, with an even or splintery fracture in places full of shells. A great many traces of fossils were seen in the limestones and slates, but only *productus æquicostatus* could be identified, the others were too imperfectly preserved.

Similar rocks were found further up the Republican river; and of fossils, *productus semireticulatus*, *terebratula subtilita*, *myalina subquadrata*, besides the columns of *crinoides*, some *bryozoa* and *gasteropodes*, *spinæ* of paleozoic *echinodermata*, &c. Some of the limestones had a yellowish or impure gray color, and an uneven fracture with numerous little cavities. Thirty-two miles above Fort Riley, near the place where this formation was observed last, I noticed several fossils of the genus *nautilus*, but could not preserve any of them.

Such are the coal measures along the route. As the outcrops of rocks were too much scattered and the stratification nearly horizontal, I could not distinctly ascertain if that part of the formation near Fort Riley is, in the geological order, above or below that near Fort Leav-

enworth. I am, however, from various reasons, inclined to believe that the rocks west of the Big Blue river are overlying the others.

In speaking of the coal measures, I have hitherto not mentioned that most useful mineral, the stone coal itself. The strata which I have described do not seem to contain much of it. It has been found at several localities, but only in small seams that would not warrant an extensive working; however, nothing can be stated with certainty until the country has been more closely examined, for strata of coal, like other rocks, change at different places in thickness and quality. In the State of Missouri, where this same formation is largely developed, hitherto no workable beds of coal have been discovered in the upper coal measures, but the middle and especially the lower series of them abound in good coal. I have no doubt that workable strata of it can be found at the depth of a few hundred feet, if not nearer the surface, provided that the middle and lower series of the coal measures extend so far west, (with their deposits of coal,) which we have no reason to doubt, if the following sandstone formation should not prove, against our supposition and against Captain Stansbury's statements, to be the same as the "Ferruginous sandstone of Missouri," which is underlying the coal measures.

Should the existence of workable strata of coal be ascertained in one place only, which might be done by boring, then we may be satisfied that they spread over an extensive area, and that any amount may be raised in the Territory for the use of railroads, manufactories, and for household purposes; and what is more, we may expect to find coal for many miles further to the west, within a depth accessible by well conducted mining. Of other minerals, only some bog iron ore has been noticed in the creeks of the eastern Kansas.

For agricultural purposes a better country than that of the coal measures can scarcely be found, the horizontal stratification of the limestones and shales making gentle slopes and rolling prairies. The soil, made by the decomposition and mixture of the materials of the different strata, is somewhat wet and cold in some places, from the great quantity of clay, but it is highly improved by a proportionate mixture with the arenaceous deposits of the quarternary system, which seems to cover the greatest part of the coal measures. The soil is, therefore, generally very good, and the settlers along the road are doing well and raise fine crops. They have nearly reached the western boundary of this district. The limestones of this formation make good building stones, especially those in the neighborhood of Fort Riley; most of them are easily quarried and dressed, and can be burned to quick lime or valuable hydraulic cements. The materials for bricks, and even the best fire-clay, are abundant.

### *Sandstone formation.*

Further up the Republican river, we next came to a sandstone formation, mostly made up of coarse-grained, friable, dark brown, ferruginous sandstones, a very compact white and some light-colored shaly sandstones extending 42 miles up the river exclusively, but noticed capped by cretaceous strata as far as 48 miles between camps 7 and 8,

80 miles above Fort Riley, that is from longitude  $96^{\circ} 52'$ , latitude  $39^{\circ} 20'$ , to longitude  $97^{\circ} 30'$ , latitude  $39^{\circ} 40'$ , thence continuing for some distance near the surface.

Between camp 4 and Parson creek we had low rolling prairies without any exposure of rocks; the soil was poor, sandy, and thoroughly dry; the drains deep and in places filled with quartz sand. Towards the south I noticed, in the distance, some steep hills, which immediately struck me as being made up of sandstone, though I could only see their shape. Some hills of the same character were northeast of Parson creek, at the crossing of which the following section was observed. The tops were formed of a yellow and brown fine grained friable sandstone, with many ferruginous concretions. Below that was a stratum of gray sandy argillaceous shale, ten inches thick, and then several layers of an impure gray and white, very fine grained, and friable shaly sandstone, in banks of about three feet thick, forming a section of twenty feet. In places it was a rather pure white quartz sandstone; in others it was spotted red.

Further on I found several small outcrops of the ferruginous sandstone, light brown, dark brown, and nearly black, more or less coarse grained, made of globular grains of quartz, and similar materials, cemented by peroxide of iron, and in places containing many ferruginous concretions. It was generally very friable, and wholly unfit for building purposes. Some pieces were more compact, and would be valuable where great strength is not required, and it seems to become harder and more durable by exposure, and then to withstand well the action of water and the atmosphere. In many instances I noticed stripes in the rock variously inclined to the planes of stratification, indicating the lines of deposition, or the way the sand was deposited by the currents of water at the time of its formation. At Rocky Ford creek I found at the water level a hard and well cemented white sandstone, fine grained with somewhat splintery fracture, making a good building stone; and then again ferruginous sandstone; between camps seven and eight I found it capped by cretaceous strata; and the last I saw of it was about four miles below camp eight, near the water level. These rocks, though extending over so large an area, were not seen forming any good sections, and it was therefore impossible to ascertain much of their range, thickness, and interstratifications; they were in nearly horizontal position. No fossils being found in them, their precise location in the geological system cannot be determined. As they are confirmably capped by the cretaceous strata, they are older than those. Their relative position to the coal measures is not so evident, as rocks closely resembling them in many respects have been observed below the coal measures in the State of Missouri, forming the upper part of the lower carboniferous formation, in which no more coal is found. My impression from the first instant was that they held a higher position, because the high sandstone hills mentioned before seemed to overlie the carboniferous rocks described before, and because the dip of the strata though very slight, had all along seemed to be rather towards the west. Of an upheaving of the lower strata not the slightest indications had been seen. In Captain Stansbury's

report I find my opinion proved that the sandstones are overlying the coal measures.

Professor Hall, in his geological notes to that report, says: "The route from the Missouri westward shows a continuation of this (upper carboniferous) limestone as far as the Big Blue, (which is nearly north of the locality in question.) Here it disappears, judging from specimens and remarks in the notes. It is soon succeeded by strata of cretaceous age, which, from the specimens preserved, I have been able to recognize as extending for a considerable distance on the route between Turkey creek and Big Sandy." Captain Stansbury remarks that near the blue the highest rock observed was ferruginous sandstone, extending further to the west, with a dip in that direction; and at another place he speaks of a sandstone formation consisting of white and red sandstones, principally the latter, above the carboniferous series. The white sandstone he describes as highly fossiliferous. Doubtless, then, these sandstones overlie the coal measures. Now, we must be satisfied with stating that in the geological order they range between the coal measures and the cretaceous strata described hereafter. From Professor Hall's remarks it seems that they are of cretaceous age, but he does not distinctly pronounce his opinion. From some of the fossils it might be easy more precisely to determine their position. Of the thickness of this formation I can give no accurate statement, as no sections could be observed, but from what I have seen I am rather inclined to think that it cannot exceed 200 or 300 feet to the utmost.

As these stones readily decompose into sand, the country is a rather gradually rising prairie. The surface is generally covered with the finest deposits of the extensive western drift formation, which are found further east over many miles of the country, under the name of bluff or loess formation. It is of arenaceous character, made up of the detritus of various rocks. Though not much productive by itself, this loess is very apt to make good soil by a proportionate mixture with clay, lime, vegetable humus and other materials, and indeed in that mixture it makes some of the best lands in Kansas and Missouri. Here, however, it rests upon the loose, coarse sand, the detritus of these sandstones, and is mixed with it, in consequence of which it is so thoroughly drained as to form a most dry and sterile country. Only a few places seem to be improved by the influence of the rocks of the cretaceous formation above these sandstones. The injurious influence of the sand may be felt even within the limits of the cretaceous formation, higher up the river, as long as it is near the surface.

In this sandstone country the creeks do not run freely, but form mere stagnant water holes, there being no medium which might force the water into springs and creeks, as it has an easy passage everywhere through the sand and sandstones.

This section of the country therefore does not seem at all fit for agriculture, though it may sustain the growth of some useful plants. Building materials are scarce, and, as has been stated above, limestones are not found in this district.

*The cretaceous formation.*

The cretaceous formation succeeded the other, and was first observed in the upper parts of the bluffs of the Republican river, between camps 7 and 8, about 74 miles above Fort Riley, where it capped the ferruginous sandstone, near longitude  $97^{\circ} 25'$ , latitude  $39^{\circ} 38'$ . It was seen up the river for about a hundred miles, to near camp 92—longitude  $98^{\circ} 45'$ , latitude  $40^{\circ} 5'$ —and along our route between Republican and Little Blue rivers, the last place being near longitude  $98^{\circ}$  and latitude  $40^{\circ} 20'$ .

As far as could be observed it was made up of light colored, fine grained, mostly chalky limestones, marles, slates and shales. I first found on the bluff loose pieces of limestones, similar to those I soon after noticed in position. Those pieces apparently form the outcrop of strata covered by the soil, containing some fossils, *inoceramus cripsii* and *amonites peracultus*. On some of the following hills the rocks could be seen in position. The top was formed of a white granular limestone and another more impure yellowish variety, full of *inoceramus*. Below there seemed to be a sandy clay, probably from the decomposition of arenaceous and argillaceous slates and then a stratum of gray, compact, sub-crystalline limestone in thin layers, full of *inoceramus cripsii*. In the lower part of the hill the ferruginous sandstone was exposed. Some miles from there, on the opposite side of the river, I observed the following section: There were 20 feet of white and yellowish limestones, somewhat chalky, with an uneven granular fracture, containing many impressions of *inoceramus*. The layers were only from 4 to 10 inches thick, interstratified with others of soft shaly or marly limestones, from 6 to 15 inches thick. In the lower part of this section the shaly layers were prevalent, assuming the character of a soft, very fine-grained, chalky white limestone, some indeed being a true chalk, which, by a chemical analysis, gave 11.2 per cent. of insoluble matter, clay, &c., the remainder being nearly pure carbonate of lime. Below these limestones 25 feet of gray sandy argillaceous shales were exposed, the base of the bluff, to a height of 20 feet, being concealed by a talus. There I did not notice any *amonites*, but, nevertheless, the strata seem to be the same as described before. Some miles further up the river, near camp 98, the upper part of this section was well exposed. The limestones, interstratified with soft layers of the same nature, were there compact, white or light yellow, mostly fine granular, some even sub-crystalline, others chalky. Some layers were nearly made up of *inoceramus cripsii*. Nearly all these cretaceous limestones show in the fracture a great many small white spots, in fact, these particles seem to form a main part of most of these rocks.

The same was observed of all the cretaceous limestones in this section of the country, as far as they came under my observation, and proves a close connexion between them all. These spots probably originate from the exuviae of microscopic animals. The cretaceous strata being rather soft and easily decomposed by the action of water and the atmosphere, and thickly covered by younger deposits of

quaternary age, show very few exposures. They generally form an open river bottom, and low bluffs gradually rising to rolling prairie or a broken country. In the banks of the river there are some small sections, but even these are not always accessible; they are generally composed of rocks that, from the distance, look like those described before. The next point where I could actually examine them was forty-five miles higher up the Republican, between camps 94 and 95; the same being found from that place, in many localities, for thirty-five miles to near camp 92. There were strata of considerable thickness of a white chalky limestone, with a very fine granular uneven fracture, and the same small white spots of probably organic origin, as mentioned above. They contained scales and other remains of fishes, and many fragments of *inoceramus* and *ostrea congesta*. A chemical analysis of this chalk gave 10.2 per cent., and of another piece only 9 per cent., of insoluble substance, (clay;) the remainder was nearly pure carbonate of lime. Below this white chalk were layers of gray marly limestones, with the same small white spots, much resembling the others except in color, and not so pure. With diluted hydrochloric acid it left 17.5 per cent. of dark colored insoluble substances. Between this marl and the chalk were some layers which presented a gradual mutation from the one into the other. Some portions were more compact and buff colored, like some of the rocks near camp 98. Fossils were found also in the marls. It seems that these strata continue for some distance up the river, though I could not find any more outcrops; at least they are not far below the surface, and act as an improving principle of the soil.

Between Republican and Little Blue the exposures were scarce, and good sections were not noticed at all. The rocks were like those observed on the Republican; light colored, fine, granular limestones, and more chalky and marly varieties. On Bryan's fork white chalky limestones were found, with *inoceramus*, *ostrea*, and remains of fishes, much like the chalk from the Republican, between camps 94 and 95, perhaps from the same layers. From that place to Blue river no exposures were seen; but the unchanged character of the country, the soil and vegetation, justifies the conclusion that the formation is still the same. After crossing the Blue we first struck the main body of the drift formation.

The greatest portion of the country occupied by the cretaceous strata is covered with heavy deposits of arenaceous character, as mentioned before in relation to the carboniferous and sandstone formations, with the bluff or loess formation, which, where the cretaceous strata are gone underground towards the west, occupies a vast area by itself, and, in connexion with the drift formation, a lower portion of the same series of quaternary deposits. It is, as stated above, a fine detritus of older rocks, here mixed more or less with the products of the decomposition of the cretaceous strata and with vegetable humus. The marls make a first rate soil, yet improved by a moderate mixture with this loess. So it may be found in many places along the river and on the creeks, especially where the gray marls are exposed. But even where the loess is more prevalent it is found to make a tolerably good soil, its natural dryness being coun-



terbalanced by the mixtures and by the influence of the underlying strata. Where no rocks are exposed the loess takes their place; so it made up part of the bluffs between camps 8 and 9, where it was seen forming in one place an isolated column of more than twenty-five feet high, like a monument.

As soon as we had reached the place where the cretaceous formation fairly replaced the underlying sandstones, the change in the growth of the plants was striking, and would well warrant to try the cultivation of this part of the country, especially where the deposits of loess are not too heavy, so that by subsoiling a more marly earth might be brought up. The best soil I have seen was in the creek and river bottoms from camp 10, near Cool Spring creek, to the western boundaries of the formation.

The creeks too have quite a different appearance in this part of the country. They are very numerous and have running water, because by the limestones, marls, and slates the water is not so readily drained off as by the loose sandstones of the underlying formations, but more humidity is retained. If, therefore, great and sudden changes of the temperature, the dryness of the summers, and the cold of the winters, should not present a serious obstacle to the cultivation of that country, which I presume we have no reason to believe, we may expect to see there flourishing settlements as soon as the roving tribes of Indians will be driven from that neighborhood. Some of the limestones of the lower part of this formation are valuable building materials, but most of them are not strong enough to withstand a considerable pressure, and therefore only fit for light masonry; they will, however, make a good lime. The chalk may well serve technical purposes. Various kinds of timber are now already growing on all the creeks, and might easily be brought to spread over a vast area. Between the cretaceous strata described now and those west of the Black hills there is not the slightest similarity in regard to their lithological character, but of the fossils some are common to both districts. They probably have been formed at different periods of the cretaceous age, and perhaps even in different oceans, without any connexion. Of the cretaceous strata of the eastern slope of the Black hills not enough is known to determine their relative order.

#### *Quarternary deposits.*

The cretaceous formation is immediately followed by quarternary deposits, the tertiary formation not being developed here as it is on the upper Missouri river. The quarternary period beginning at the close of the tertiary continues to the present day. By far most of the deposits in question range in the lower part of this formation, more especially called drift formation. I will not speak any more of those quarternary deposits mentioned above, which, generally more recent, cover to a large extent the cretaceous and carboniferous strata, but I only will describe the main body of this formation, which, to the exclusion of all other rocks, occupies the country along our route for several hundred miles.

On closer examination it might be found convenient to make a subdivision, and describe the rocky portion and the quite loose materials.



separate from each other, but thus far it was impossible to trace a dividing line, the rocks themselves containing many loose inter-stratifications quite like those deposits without rocks. The name drift clearly indicates that most of these deposits are made up of the detritus of older rocks drifted by the water. The igneous and metamorphic rocks seem to have furnished the main part of the materials, though the paleozoic and cretaceous rocks are certainly not excluded, but only more decomposed, because they are generally softer. The harder rocks, such as various granites and sienites, porphyry, hornblende, slate, quartz-rock, flint, chalcedony, are found partly as large pebbles, partly reduced to smaller size, forming gravel and coarse sand, which, mixed with other materials, and becoming more and more fine, at last makes the very finest sediment, wherein the constituent rocks cannot be more distinguished. It is generally of light brown or buff color, arenaceous indeed, but not purely silicious. Analyses of it from two different localities gave:

Silica.....	76	per cent.	77	per cent.
Alumina, with a few peroxide of iron.....	22	"	22	"
Calcia.....	1.5	"	traces.	

It is evident, therefore, that the feldspatic minerals undoubtedly forming a main part of this sand have lost all, or nearly all, of their alkaline and other more easily decomposed matter, but the influences acting upon them have not been strong enough to change them throughout and convert them into kaoline, which, mixed with the particles of silix, would make a sandy clay. Where this finest sand is best developed, it has not the slightest mixture of clay, its adhesive properties in a wet state being only the consequence of the great coherency between particles as fine as dust, and quite independent of the mineralogical character. By a continued influence of water, it seems able really to undergo that change and to become clayey, as it may be seen on many small water ponds, if the clay in such places is not, perhaps, of a different origin. In some localities small particles of mica may be seen in this sand, in others it is not quite so fine, and then often more purely silicious and less coherent.

All these varieties of drift sand are partly loose, partly more or less cemented by calcareous or silicious elements, so as to form rocks. Of these latter, some are more or less coarse drift sandstones, and even conglomerates, cemented by carbonate of lime, partly compact, partly porous like a tufa; in others the sand has so well united with a silicious cement as to make the hardest rocks. Some are merely the fine buff colored sand, with scarcely any cement, or with very small quantities of peroxide of iron, interstratified with the more compact strata; and in other instances these layers of sand are in all directions penetrated by root-like veins of silicate and by carbonate of lime, and thereby only partially loose. Some of the strata are highly calcareous sandstones, others might be called impure arenaceous and silicious limestones, but those are rather scarce, and the character of the formation in general is sandy.

I noticed a few pure limestones and some strata of argillaceous shales, which cannot, perhaps, all be referred to this formation. It

will be best to describe the strata in the order I found them along the route, at first from Little Blue river to the Black hills—from longitude  $98^{\circ}$ , latitude  $40^{\circ} 20'$ , to longitude  $104^{\circ} 45'$ , latitude  $41^{\circ} 20'$ .

Crossing Little Blue river, we found heavy deposits of drift, coarse sand, and pebbles, and the fine sand of light brown color, described above, which seemed to compose the hills by itself. The vegetation was much poorer than before in consequence of this change of the formation. The frequent occurrence of white, chalky pieces of limestone, not much rounded in the sand, which, besides, was not uniform, indicated, however, that the cretaceous strata were yet near. In the fine sand I noticed the shells of several species of little gasteropopodes, which I found also in other places in this sand on Platte river and Republican fork. They seem to be found only where it is in second position, as altered drifts.

The plateau between Blue and Platte is made up of this sand. In the banks of Platte river it is mixed with coarse drift and more or less clay. The valley of that river is wide open, and the bluffs are generally composed of the same very finest drift sand. The finer the sand the more coherent it is, standing well in perpendicular escarpments, and cut by many deep ravines in the most picturesque style. This character of the bluffs is best developed from about twenty miles above Fort Kearney, near to the forks of Platte river. The analyses mentioned above were made of sand from this part of the country. Nearer to Fort Kearney the sand is coarser and looser, and the bluffs, therefore, by far not so prominent and characteristic, and further west rocks take part in the formation of the bluffs. A distinct stratification of the sandy deposits could be observed in a few places only, where it was indicated by a slight change in the physical properties of the sand. In some localities dark colored interstratifications were noticed in the bluffs, made by a mixture of the sand with vegetable matter, especially on the Republican river. They apparently indicated a growth of plants during the formation of the bluffs, and a full and succeeding rise of the waters which deposited this sand. I found only such bones in this part of the country as were doubtless newly covered by the sand of now living animals. Further on, in the rocky part of the formation, a few small pieces of petrified bones were observed, without any characteristic parts, which have certainly belonged to similar animals. The first small expose of rocks was in the bluffs near the forks of Platte river, where I noticed a fine buff colored drift sandstone, more or less strongly cemented by carbonate of lime, partly porous like a tufa, partly compact. A specimen of the former variety was analyzed, and gave—

Undecomposed sand, silica, and some alumina.....55 parts ;  
Carbonate of lime, nearly pure, forming the other.....45 parts.

There was also a light-gray fine grained soft and porous sandstone, full of petrified fruit-stones of the size of cherry stones, which have a close resemblance to the seeds of the now living genus *celtis*. This rock capped a stratum of loose sand. The same fruit-stones were found in other rocks of this formation on Pole creek, in the Pine bluffs, and on the branch of Rock creek near camp 70. In the loose

sand near the forks of Platte river I found a similar fruit-stone, not yet petrified. If any proof was required that these rocks are quarternary and not of some old formation, which however is evident from their lithological character alone, the presence of these fruit-stones of *celtis* and the remnants of bones would be ample testimonials.

Following the south fork of Platte river, these sandstones were noticed for nearly ten miles; then the sand again covers the whole country, not however so fine, and therefore looser and not apt to form escarpments. The country is an uneven sterile plain, with single hills and gentle slopes.

Between camps 22 and 23, the banks of the river showed deep cuts of a fine white micaceous sandstone, rather friable, with ferruginous spots, and in the bluffs on the north side of the river seemed to be rocks. By and by the fine sand was now replaced by coarse sand and gravel, which continued nearly all along our route up South Platte and Pole creek to the mountains.

Among the pebbles found in this drift were:

1. Granite of brown and white feldspar, quartz, and specular iron ore, replacing the mica like in some granites from the Black hills.
2. Quartz with a white mica, probably a piece of a coarse crystalline granite.
3. Granite of pink feldspar, quartz, and few white mica.
4. Granite of coarse white feldspar, quartz, and few white mica.
5. Porphyry of reddish brown color with crystals of quartz.
6. Dark colored splintery quartz rock.
7. Metamorphic slates of various description.
8. Jasper, flint, chalcedony, &c.

In other localities green hornblende was found in various connexions with quartz and feldspar. Most of these pebbles are by far too small to be reliable specimens of the rocks, because small pieces taken at random seldom show well the characteristics of an igneous rock, generally not containing all the minerals composing the rock, nor in the right proportions or shape.

Between camps 23 and 24, the bluff of the north side of the river, coming close to the water, showed for some distance exposures of rocks. In a section five miles below camp 24, sixty-five feet high, I noticed at the top gravel and sand, thin layers of gray, buff, and white drift sandstone, fine grained with calcareous cement and silicious concretions and veins like roots of plants. Most of these rocks were not compact, but irregularly porous, harder and softer portions being mixed indiscriminately. Some of the harder pieces looked as if they were limestones of an older formation, which, by being partly decomposed, themselves had furnished the cementing lime to the sandstones. One such piece gave by analysis only 11 per cent. of insoluble substances, the remaining 89 parts being nearly pure carbonate of lime.

Other pieces were very compact, and contained a great deal of silicious cement. These stones are interstratified with heavy layers of the buff colored, loose, or only slightly cemented sand, mixed with pieces of rock and full of irregular veins and concretions of white color, such as they were noticed in the strata of rocks. These bodies, where free of sand, are very hard, and contain only a small quantity of car-

bonate of lime. They withstand the influence of strong hydrochloric acid. An analysis gave:

Silica.....	79 per cent.
Alumina, with traces of peroxide of iron.....	10 “
Water (seeming to be a constituent of the mineral).....	45 “
Magnesia.....	1.5 “
Carbonate of lime.....	6 “

A part of the carbonate of lime is mixed with the mineral, as impurity. Another part seems to be united with silicious acid as calcia. Generally the quantity of carbonate of lime is much greater, and the mineral is strongly mixed with sand.

At the foot of the bluff, in a loose rock fallen down from above, I found large pieces of a soft, white substance which bears great resemblance to chalk, and was mixed with sand. A pure piece was analyzed and found to be a mixture of a silicate, containing caloid and some carbonate of lime. The analysis gave:

Silica.....	45.5 per cent.
Alumina.....	15.5 “
Water (a part of which is hygroscopic).....	14.5 “
Carbonate of lime, 33 per cent.—equal to calcia.....	11.0 “
And carbonate of lime.....	13.5 “

Only a small part of this mineral is soluble in hydrochloric acid. Thence we travelled more than fifty miles in the most sterile, sandy, and gravelly country, up South Platte river and Pole creek, before rocks were again seen; but in approaching the pine bluffs on Pole creek we came to the more rocky part of the formation. Between camps 27 and 28 were many exposures similar to the last one; some of the rocks were close-grained and conglomeratic. The loose sandy layers were here also by far predominant. Somewhat further on, where from both sides the bluffs draw near the creek, and are called Pine bluffs, they make perpendicular escarpments, and bold, picturesque, and wild forms, cut by numerous deep and rough ravines. There are some isolated chimney rocks, and others like forts and castles, which remind me of the descriptions given of the “Chimney Rock” and “Court House” on the Laramie road, which are probably the same formation.

The perpendicular walls were made up of a reddish, light-colored, fine sand, only slightly cemented, capped by a layer of a compact, fine grained, light colored, drift sandstone, with much silica, calcareous cement.

Further on the bluffs were no more perpendicular, but formed rough steps, exposing again a series of layers of the buff colored loose sand with the silicious veins and concretions, and of compact rocks like those described.

There were fine grained drift sandstones, coarse sandy rocks, the porous calcareous sandstones, and the silico-calcareous rock mentioned above, but only few of the conglomeratic rocks. This formation continues up the creek with short interruptions, where the sand covers all the rocks, and with slight changes in the lithological character of

the strata. The soil is so coarse, sandy, that the creek in several places runs underground for miles, and comes again to the surface with a swift current, sometimes only for a few yards, then to continue the same play.

Between camps 29 and 31 prominent white layers were seen, of a very fine grained quartz sandstone, slightly micaceous, and with a few grains only that look like the common drift sand. It is generally soft, in places rather hard, but easily wrought. Some miles below the Cedar bluffs, the following section was observed. The banks of the creek were formed of a fine grained, light colored, soft, somewhat micaceous sandstone, changing upward into an argillaceous shaly sandstone; then a small stratum of buff colored, argillaceous shale, with a conchoidal fracture overlaid by the same shaly sandstone. This small layer of shale is the only one found along our route on Platte river and Pole creek. Higher up the hill was made up of fine grained, well cemented, drift sandstones, with only a few coarser grains of some porous drift sandstones with calcareous cement and interstratifications of slightly coherent sand.

Towards the top of the bluff the rock was more coarse grained, and there were some prominent escarpments of a reddish sand, not quite fine, and only imperfectly cemented.

The strata of the middle part of this section form the Cedar bluffs and the few outcrops seen for some distance to the west. Two miles west of camp 33, in the bluffs, a very fine grained, compact, pure white, calcareous sandrock was found, and 15 miles hence were similar sandstones, interstratified with coarse drift sandstone and slightly cemented sand. Some of the strata were highly micaceous and gray. These rocks are found in many places near the route, but generally only in short outcrops.

Near the Black hills the country was much broken, and the rocks were noticed rising visibly towards the mountains; their dip, however, did not exceed a few degrees, and they are apparently not heaved up by the igneous rocks, but were deposited long after the mountains had been formed. The top of some of the ridges were formed by a compact conglomeratic rock, with much fine grained silicious cement interstratified irregularly with loose gravel. Lower down more fine grained drift rocks were noticed, and an outcrop of a pure, hard, white stone, with an uneven fracture, in which, besides irregular veins of brown sand, only by a careful examination small grains of sand may be observed throughout the rock; it contains, also, small crystals of calcspar. This calcareous sandstone is similar to that near camp 33, but it seems to contain still more lime. An analysis gave:

Silica.....	45 per cent.
Alumina .....	12 "
Magnesia.....	1 "
Carbonate of lime.....	42 "

The softer interstratifications were not exposed. In the banks of the creek was an impure, white, fine grained sandstone, in heavy layers, partly rather loose, much like the sandstones observed between camps 29 and 31.

Leaving it to further examinations to determine the superposition of all these strata of the drift formation, I shall now describe those I found on the waters of the Republican fork and on the South Platte river. Among them are some shales, which I cannot, with certainty, call quarternary, and which may, perhaps, be outliers of the cretaceous strata; but as no fossils have been found in them, nor any other characteristics, their position is doubtful, and I think it is best to describe them in the series of the other rocks among which they were found. To present an easier comparison, I will enumerate them, beginning from the eastern extremity.

The last outcrops are unquestionably cretaceous. Strata were noticed near camp 92, not far from longitude  $98^{\circ} 45'$ , latitude  $40^{\circ} 5'$ ; but the marshy nature of the river bottom, and the great number of creeks we had to cross, apparently originating from layers of shales, compel me to believe that the cretaceous formation extends further westwards, perhaps, with local undulations of the stratification covered by heavy quarternary deposits.

We first travelled over a broken country at a short distance from the river, but generally through a level bottom. The bluffs were mostly low, and all the country was covered with the very finest coherent light brown sand mentioned before, making a good road. Gravel was found only in small quantities along some creeks, but not forming extensive deposits. It may be concluded, however, from the shape of the bluffs, that the sand does not make them up by itself in first position, or they would present another aspect and be cut by deep ravines. Indeed, between camps 88 and 87 some outcrops of rocks were seen on the southern side of the river, and more rocks were on that side above and below camps 85 and 86. I rode over and found the following strata:

Below the covering sand was a heavy layer of whitish color and uniform structure, to the utmost porous, a mixture of sand and earthy carbonate of lime. Though not hard, it withstands well the influence of the atmosphere, forming, for a short distance, a prominent outcrop. In some places the top of this layer is a very hard rock of quite different appearance, which seems to be produced by a tendency of crystallization of the carbonate of lime; it is sub-crystalline and compact, but perforated by veins of coarse drift sand. Lower down it is a series of similar strata of earthy limestone, with much fine sand, and, perhaps, an argillaceous mixture. A soft, chalky piece from one of these layers was found to consist of—

Silica, 38 parts; alumina, with some oxide of iron, 14 parts; magnesia, 2 parts; carbonate of lime, 48 parts.

A small quantity of the latter is in the stone as calcia, without carbonic acid, in connexion with silica. In other places these strata are more sandy, and in some the silicious root-like veins were observed.

Near the water level gray argillaceous shales were observed, undoubtedly extending over a much longer distance, and, perhaps, the same as those noticed 60 miles higher up the river. They are, apparently, the cause of the numerous creeks in this part of the country, and make the river bottom clayey in many places.

The next rocks were found east of camp 80, thirty-seven miles from those described last, and more between camps 80 and 78, which is



opposite the mouth of Viho-Mappi or Frenchman Fork, near longitude  $100^{\circ} 20'$ , latitude  $40^{\circ} 18'$ . They were all drift sandstone, some with little calcareous cement, others fine, sandy, with more lime, somewhat chalky; others were hard calcareous sandstones or limestones, mixed with a great deal of sand. Near by loose buff colored sand, with root-like concretions, was interstratified with the rocks, making these sections not unlike some of the upper Pole creek, but these here contain much more lime.

In the section below camp 78 silicious limestones were prevailing. One of them white and compact, with an uneven fracture, was full of the impressions of little shells, mostly of gasterpodes and of a small acephale. An analysis of this rock gave insoluble substances; sand and silicates, 5.5 parts; carbonate of lime, nearly pure, 94.5 parts. It is, therefore, a very pure limestone, the only one which came under my observation from the whole of the drift formation. There were also some interstratifications of coarse, loose, drift sandstones. As many of the rocks in this district contain so much lime, I am inclined to believe that the rocks of the cretaceous period have contributed greatly to the materials of which they have been formed, and may be found, probably, near by.

A few miles below this last outcrop of rocks argillaceous shales were again found by digging at the foot of the bluffs. Most of them were gray, some brown and purple. What I have stated before of the doubtful position of some shales is to be applied to these here and those noted before. If they are not outliers of the cretaceous strata, they at least seem to form the lowest portion of the drift formation. From this place upwards on Republican river and Arickaree fork the finest arenaceous deposits were observed, forming the whole country. They were developed with their characteristic features, making high bluffs, cut by many deep ravines, with perpendicular walls, just as we had seen before between Fort Kearny and the forks of Platte river. Some layers of the sand more coarse, and therefore less coherent, had been partly swept away, the remainder forming loose masses like snow-drifts on some of the bluffs between camps 75 and 77, a play of the winds by which they are constantly changed. In other places the fine sand was in single layers, strongly mixed with vegetable matter, forming interstratifications of a black soil in the bluffs. On Rock creek, and on its branch from near camp 72 to 70, the rocky part of the formation is exposed like on Pole creek. There are strata of hard rocks mixed with loose sandy ones, the latter partly forming prominent escarpments somewhat like those of the Pine bluffs. Of the rocks, some are buff-colored, friable, and porous calcareous drift sandstones; some are whitish, fine-grained sandstones, like some that had been found on the upper Pole creek, others were much calcareous, and few only were hard and compact. Near camp 70 I noticed in a fine-grained drift sandstone the same fruit stones of celtis as I had found on Platte river.

Crossing the ridge between Republican and South Platte, we found the highest points made up of loose, deep, and sterile quartz sand, but the intervening high prairies were generally covered with the



brown, coherent, fine, sandy soil, and had a good growth of buffalo grass.

Near camp 69, on Dog creek, was an outcrop of a loose, rather fine-grained drift sandstone, with some calcareous cement, and the concretions so often mentioned, interstratified with loose sand. Some portions of this rock were more calcareous, and large pieces of it look like a somewhat splintery limestone, irregularly mixed with sand, but even the splintery pieces contain a great many fine grains of sand, and an analysis of the purest parts gave 35 per cent. of substances insoluble in diluted hydro-chlorine acid, or sand, and only 65 per cent. of carbonate of lime. An analysis of large pieces would show a considerable increase in sand.

Near by was found a loose piece of opal—a mineral composed of silica and water; it is a white pellucid variety, near to the precious opal. Other drift sandstones were noticed in ravines, near camp 68. The bank of the creek, near that camp, was formed by a slightly cemented drift sandstone, underlaid by blueish-gray argillaceous shales, making a good clay. These shales were exposed for a few yards only, and nothing more could be ascertained of them, as the rocks were not exposed upon which they reposed, nor were there any outcrops from that place down to the South Platte, nor on the river in that neighborhood. Near by was observed an argillaceous substance, like kaoline, mixed with the loose sands and boulders of a limestone of another formation, much like some cretaceous rocks.

On the south fork of the Platte river the country was sandy. In some districts a loose quartz sand was prevailing; in others the fine sandy soil was found. Only a few exposures of rocks were observed, so small and rotten that they are scarcely worth notice. Between camps 65 and 64, gray and yellow shaly, rotten sandstones, and loose sand were noticed, besides some hard brown sandstones and a fine grained gray, compact, brittle sandstone, which struck me by its similarity to a sandstone of the cretaceous formation of the Upper North Platte river; it contained small brown particles, like charred vegetable substances. The cretaceous formation having been recognized in fossils of the eastern slope of the Black hills on Cache la Poudre creek. I am inclined to believe that these strata are of the same age. Between camps 62 and 63 were again some small exposures of a conglomeratic rock and a light yellowish fine sand, partly loose, partly cemented, and in most of the outcrops capped by a compact brown sand rock, with a strong silicious cement. It must be reserved to further explorations to determine more precisely the geological order of these rocks.

After having given the description of the quarternary strata, I will direct attention to the following facts:

In comparing the deposits along both routes, we find in the west a rocky portion, and in the middle, a district where the fine arenaceous deposits present a most characteristic development. On the Republican, we notice thence easterly again, rocks, though generally concealed by heavy deposits of loose materials. The latter, alone, were seen on Platte and Little Blue rivers, though the distance between both routes is not considerable. It is, therefore, probable that on Blue and Platte

there are also rocks east of Fort Kearny, but that they are buried under the drift.

On account of the insufficiency of the exposures, I am unable to give a complete section of this formation, nor to estimate its thickness. The difficulty is the greater because the lithological character of the rocks of that kind is much too changeable to rely upon in comparing strata from distant localities. The same layer may be coarse grained and compact one place, fine grained in another, and a loose fine sand in a third. The thickness of the single strata is variable in the same degree. Where the country is covered with the coarser varieties of sand and with gravel, it is most sterile; but where the fine coherent buff-colored sand makes up the surface it is generally covered with a good growth of buffalo grass—at least in the spring and fall. For cultivation no part of it seems fit, where this formation is developed, to the exclusion of other rocks; the dryness of the sand being an impediment not easily overcome.

Building stones may be found wherever the rocky portion of the formation has been noticed, though many of the stones will be crushed by a considerable pressure. Limestones for making mortar are scarce; the only pure ones found in large quantities was that from the Republican, near the mouth of Frenchman fork. Nearly all the other limestones I have seen are too impure, or the purer pieces are too much scattered and mixed with sand.

On a geological map of North America, published by Jules Marcou, Paris, 1856, the district occupied by the quarternary strata is marked with the colors of the triassic and jurassic formations. As Mr. Marcou did not see that country himself, nor can have been in possession of reliable statements, it is sufficient to remark that he is mistaken. The boundaries of the formations all along our route are, for the same reason, put down incorrectly on that map.

### *The Black hills.*

Towards the head of Pole creek, near longitude  $104^{\circ} 45'$ , latitude  $41^{\circ} 20'$ , the Black hills rise out of the plains with a sudden and steep ascent. They form there a ridge of not great width, so that a drive of 18 miles only is required to cross them, and to get to the Laramie plains. Their main body is made up of granite sienitic rocks, which in rising have heaved up old stratified rocks, now covering both slopes, and in some places even forming the highest points of these mountains. Near Pole creek, on the eastern slope, these stratified rocks were seen on for a short distance, forming some good and high sections.

They are more or less altered sandstones and limestones, dipping in various directions and degrees. Most of the sandstones are fine-grained, light yellowish-red, and do look much like metamorphic, but some show the transition into a silicious rock, which, in single pieces, is more changed into flint or chalcedony, and the more impure portions into a common jasper. Besides, there are heavy strata of a loose dark red, and a red shaly sandstone. Most of the limestones are altered into beautiful marbles. Some are pure white, some gray, and

others variegated gray and purple. They form heavy layers. In these stones scarcely any sizes of fossils could be found. Their lithological character is similar to that of rocks noticed on the other slope of the Black hills and round the Medicine-Bon butte. Most of the granites were composed of light red feldspar, quartz, and black mica; some were small crystalline, and some forming veins in the other granites, were so coarse crystalline that the single pieces of pink feldspar and quartz weighed several pounds. In some of the granites the feldspar was white.

The sienites were small or coarse crystalline, made up of red feldspar, black hornblende and quartz, which was wanting in others. Some of these igneous rocks could take a beautiful polish. They form the most picturesque sceneries in some places, making steep conic mountains, covered over with large boulders and pine trees, in others perpendicular walls and bare rocks of every imaginable shape. The western slope of the Black hills is also composed of paleozoic stratified rocks, like those of the eastern slope. They are not heaved up so irregularly, but rising gradually out of the plains, have at the base a dip of only a few degrees, which, towards the top of the mountain, increases to 15 degrees and more. They make some of the highest points of the Black hills. I observed again the yellowish-red and the loose dark red sandstones, and another with a reddish outside, inside more whitish, with imperfect indications of fossils. Besides, there were various altered limestones and marbles, most gray, some white and some beautiful pink, full of the white spatic sections of the columns of crinoides. All these marbles are sub-crystalline, and split in all directions by many fissures, which partly are filled again with calcspar, and in which they easily break. These rocks, and those of the other slope described before, resemble in their lithological character some of the upper silurian strata of Missouri. They are seen again upheaved in several places along the Medicine-Bon mountains.

Crossing the Black hills the second time further to the south, on the waters of Cache la Poudre creek, I noticed similar rocks. The main body of the mountains was then also made up of granites and sienites and the slopes of the stratified rocks, which on the western slope were rising gradually and not to a considerable height, and therefore did not show good sections. East of Laramie river I found a dark colored compact rock with a conchoidal fracture somewhat decomposed, and like a disintegrating basalt. I could not ascertain if this stone is igneous or highly metamorphosed. It is the same I observed near the Medicine-Bon butte, where I noticed also most of the other rocks I found at this place; dark colored sandy and argillaceous shales, some metamorphic sandrocks, a few marbles, and many red and white sandstones. Not far from camp 56 I found a friable sandstone made up of coarse square grains of granite, apparently deposited after the formation of the igneous rocks. The same I noticed at other places in the hills. It seems to be a local deposit. Near camp 56 was also a coarse crystalline sienite, much like that found further north, made up of brownish red feldspar, with black hornblende and more or less quartz. Some varieties were coarse; others small crystalline; some were dark colored, by an increase in the amount of hornblende, and

some whitish, by much quartz. Other rocks noticed there, looking like trap rocks, seem to be large pieces of stratified rocks which have fallen in the sienite when it came up still fused, and have thereby become strongly metamorphosed. The other igneous rocks were also like those found further north. Besides, I noticed between camps 56 and 57 rocks of red feldspar and specular iron ore, and another of greenish gray color, very small crystalline, with black spots; it seems to be a sienitic rock with white feldspar, and is much like some of the igneous rocks of the tertiary period of Europe.

Between camps 57 and 58 mica schist is largely developed, crossed by many granitic veins, and intersected by hills of granite; one of these was composed of light red, nearly white feldspar, quartz, and specular iron ore, the latter being in some pieces in such a quantity that they made a rich mineral.

Towards camp 58 the stratified rocks form high prominent exposures east of the road.

I found there the light yellowish, red fine grained sandstone, mentioned above, and a gray variety; above it a layer of a dark red sandstone, coarse-grained, soft, and highly micaceous, in places not unlike a dark mica schist. Above that I noticed white and red sandstones and some few marbles, with imperfect traces of the columns of crinoides. These rocks were dipping in various directions, generally to the east; some were nearly horizontal. Between camps 58 and 59 we had for a long distance to our right the mountains covered with boulders of granite and mica schist, and to our left the upheaved stratified rocks. A piece of granite found in the creek contained much white mica, which I have not seen in the Black hills; it comes probably from the mountains to the southwest.

Near the place where Cache la Poudre creek breaks through the last chain of rocks to enter the plains, I observed in the sandstones interstratifications of altered sandy shales and shaly limestones. Some of these were highly fossiliferous, full of the remains of fishes and shells, and foetid from the great amount of organic matter. The fossils are, however, preserved badly. Dr. Shumard has examined them and found that they are undoubtedly of cretaceous age. He has identified *Inoceramus sagensis* and *I. fragilis*.

These cretaceous strata are apparently heaved up by the igneous rocks and form probably the upper portion of the stratified rocks described before. As I have found fossils only at that place, and we then left the mountains, I cannot give a more detailed account of the occurrence of the cretaceous strata on the slope of the Black hills, nor determine the dividing line between the cretaceous and older rocks.

Further east, on the South Platte river, I noticed a few rocks which are probably of the same age, and which I have described already with the quarternary deposits. All these rocks are different from those of the cretaceous formation on the lower Republican river, and seem to belong to another subdivision of that period. Of metallic minerals, iron ore seems to be in great abundance in the Black hills, taking a part in the formation of the igneous rocks. By examining the country more closely it will be probably found forming rich deposits. Of other minerals no indications were noticed, nor could I expect to find

any near a road so frequently travelled, without having the time required for explorations of that kind.

*The Medicine-Bon mountains.*

The outer range of these mountains was high and steep, composed partly of mica schist, hornblende rock and hornblende slate, partly of other metamorphosed slates and sandstones, changing into quartz rock, covered over with tumbling rocks of the same kind which continued to the plains, thickly covering the country to the distance of several miles, mixed with sand and gravel. Among them was quartz rock of all colors and varieties; pure white and pellucid, gray, green, bluish, flint, chalcedony, agate, jasper and common sand rock. In some places at the southeastern end of these mountains, and near the Medicine-Bon butte, less altered, stratified rocks were heaved up, and seemed to be the same as had been observed on the slope of the Black hills.

In the adjoining country, known as the Laramie plains, as far as it came under my observation, the cretaceous formation was developed, forming the continuation of the extensive western cretaceous deposits well exposed in the upper North Platte river and Sage creek.

Round the Medicine-Bon butte the stratification is much disturbed. The main part of this mountain is made up of mica schist and granitic rocks, round which, from all sides, white and red sandstones and some marbles and slates are heaved up, forming, at the north side, several projecting ridges about the central mountain. The cretaceous strata are there partly in their natural position, undisturbed and nearly horizontal; others, however, are dislocated by igneous influences. It is proved thereby that here, as well as in the Black hills, revolutions have taken place at the time the cretaceous strata were formed. I will describe these stratified rocks as I found them, one after the other.

Between Medicine-Bon creek and Pass creek, south of the butte, was an exposure of sandy, argillaceous slate, and above it a layer of a yellow unctuous matter, covered on the surface with an efflorescence of salts, which seemed to be a product of the decomposition of the igneous rocks. It readily imbibes water, and thereby increases much in volume and becomes plastic. An analysis of a piece which had lost most of its soluble parts gave—

Water, 18 per cent.; silica, 51 per cent.; alumina, 30 per cent.; calcia, traces.

Nearer to camp 42 were similar layers; some, also, yellowish, some green, with a talcose structure. The specimens of this variety separated in the water into a light yellow stuff like the other, and in dark colored heavier particles. Analysis gave:

Water, 14 per cent.; silica, 55.5 per cent.; alumina, 30.5 per cent.; calcia, traces.

It is, therefore, a mineral similar in its composition and properties to the bole and pimelite. Many crystals of gypsum were disseminated through these strata, and efflorescences of salt on the surface tasted like potash or soda.

These minerals were interstratified with rotten slate and a layer of a dark bluish gray, nearly black stone, with a conchoidal fracture, heavy, compact and brittle, and somewhat decomposed, and therefrom having a concentric structure, like a disintegrating basalt. The exposure was too small to show well the character of this rock, but the irregularities of stratification, issuing, as it seems, from that place, confirm me in the opinion that it is an igneous rock, though it might, perhaps, be a highly metamorphosed slate. It is the same I found on the western slope of the Black hills, near Laramie river. Near by were several layers of a fine grained, sub-crystallined, foetid limestone, in some places even bituminous, from the great amount of organic remains. Other portions were mixed with a great deal of micaceous sand, so much so as to make a micaceous sandstone. Fossils were abundant in it, and were recognized as belonging to the cretaceous formation. A layer of sandy calcareous shales, not far off, was nearly made up of large globular concretions, which were hollow and lined inside with crystals of calcspar. This seemed also to be effected by igneous influences.

Bluish gray, thinly laminated, rotten shales were seen with a dip of sixty degrees on the slope of the mountains, overlying a white, fine grained quartz sandstone, below which was a loose, red sandstone, and some white and gray marbles. West of the butte, along Pass creek, were heavy deposits of white quartz sand, mixed with other detritus covered with boulders. Near the butte of Pass creek (camp 43) I noticed in this drift a coarse grained, friable, white sandstone, and in it many concretions of sand, with a most singular structure. From one central point they were split in all directions, and in such a way, that in breaking they presented the appearance of a fan; not in one plane only, but throughout the rock.

Passing north of the butte, I found the following strata: from Pass creek we first came over sandy hills; towards the north, high sandstone ridges were seen; I there noticed dark rotten slates and argillaceous shale, and a dark blue tough clay, interstratified with some more metamorphosed black slate. Below them was a light colored sand rock, forming prominent escarpments; then a layer of red sandy shale, a white sandstone, and still nearer to the centre a thick strata of dark red and yellowish red loose sandstones, interstratified with some clay. These rocks were similar to those observed on the slope of the Black hills. I found here only loose pieces of marbles, but did not see them in position. The white sandstones and quartz rocks form high crested ridges around the butte, with, in places, a nearly vertical dip; the lower strata, washed away by the water, formed parallel depressions.

Near camp 50, on Elk creek, I found a rounded piece of a grayish sub-crystalline limestone, which may perhaps be in position near that place. It was full of various species of fossils, such as spirifer, chonetes, orthis, orthoceras, carocardium, &c., and of paleozoic, probably devonian age. Professor Hall has recognized devonian strata between Fort Laramie and the Red buttes, and it is, therefore, likely that they extend to this place below the younger formations, and have been heaved up by the igneous rocks.



Near Elk creek I noticed also a great deal of iron ore in loose pieces. Some were rather pure brown, or red hematite; others were more silicious, and some pieces presented a transition into a highly ferruginous silicious rock, or were mixed with jasper. Jasper, flint, and chalcedony accompanied the mineral. It is evident, therefore, that it originates from the metamorphic sandstones, in which it forms, probably, concretions or a lode.

East of that locality on the road the strata were undisturbed and undoubtedly cretaceous; they will be described in the next chapter. Among the dislocated strata on the other side of Camp 50 were many gray slates in which no fossils were noticed. Their age, therefore, cannot be determined. Probably they are also cretaceous; at least we have seen that south of the butte undoubtedly cretaceous strata have been heaved up. The only igneous rocks I noticed in the continuation of our survey to the west were some boulders near Bryan's pass. They were pieces of a white granite, of white feldspar, quartz, and few dark mica, accompanied by quartz rock and metamorphic slates. These rocks were not observed in position.

#### *The western cretaceous formation.*

The cretaceous formation which we had found further east on the Republican river was also developed largely, but with a different character, in the country west of the Black hills, in the Laramie plains, and on the upper North Platte river and Sage creek. As we did not proceed further westward we did not reach its western boundaries, but, from the notes found in Captain Stansbury's report, I conclude that this formation extends much further to the west, probably beyond Green river. As far as it came under my observation, the upper part of the formation is wholly made up of sandstones; sandstones, interstratified with slates and argillaceous and sandy shales, compose the middle portions, containing strata of coal; and in the lower portion slates and shales prevail. Limestones are scarce. The strata of coal render the investigations of the character and extension of this formation highly important.

This coal resembles in its properties that variety of brown coal which is most like the stone coal found in the coal measures. It is black, breaks easily into angular fragments, and makes a dark brown, nearly black powder. By charring it a coke is obtained of the same shape, not in the least smelted, but split in every direction and very brittle, of a dark gray color, with a metallic shine. A specimen from the bluffs of North Platte river, gave, by a slow distillation, 50.5 parts of coke, including 5 parts of ashes, from 100 parts of coal. To burn the coal requires a strong draught, but it keeps the fire for a long time. For technical purposes, it is inferior to the coal of the older formations, because its heating power is less, breaks easily, and gives a brittle coke which is unable to withstand pressure and allow transportation. With proper arrangements, it is, nevertheless, a most useful fuel for manufactories, even for such as require the highest degree of heat, with the only exception of high furnaces, in which the coke would be reduced to powder, and then stop the conflagration.



I found strata of coal on the Laramie plains, at the foot of the Medicine-Bon mountains, and on the North Platte river, near the mouth of Sage creek; not far from the place where this formation had before been noticed by Col. Frémont, who mistook it for the oolitic or jurassic formation. By Capt. Stansbury it has been found further west on Bitter creek at several places, and he mentioned its occurrence on Green river.

The value of these deposits of coal would be enormous if they were in a cultivable country; but as it is, they are probably of no use, unless a railroad should be constructed through that country, and require them as fuel. We cannot be surprised at finding extensive strata of coal in the cretaceous formation; for, although the coal measures of the paleozoic age and the tertiary formation generally include the greatest abundance of coal, it has also been found in the deposits of all the other geological periods in larger or smaller quantities. I will describe the strata in the order I found them along the route.

Between the Black hills and the Laramie river the country was sandy and gravelly; but further to the west, especially at some distance to the north of the Medicine-Bon mountains, the soil showed a strong mixture of clay, and some exposures of argillaceous shales were observed, which is one of the causes that make a luxuriant growth of artemisia replace all other vegetation over an extensive area west of the Black hills. I noticed some lakes and ponds, partly dry, the water of which had a somewhat salty taste. The crystallization of salts from the margin of these ponds were examined from two localities, and found to consist, principally, of the sulphate of magnesia, with some per cent. of chloride of magnesium and traces of alkalis. The water may contain more alkalis than these crystallizations on the margin, for they probably contain those salts only which first crystallize out of the saturated solution in proportion as the water grew less by evaporation.

Some miles west of Laramie river, along the road, many outcrops of a coarse-grained, friable, yellowish micaceous sandstone were noticed, with a horizontal stratification. At a short distance from the road, east of Trappes creek, sandy argillaceous shales were observed, with many vegetable remains altered into a substance like lignite, and giving the stone a brown color. The plants were too imperfectly preserved to be recognized; but they were evidently not such as are found in the carboniferous strata, and more like those of the more recent formations. A light gray, fine-grained, soft quartz sandstone was observed below these shales, with many small, dark colored greenish particles, which are a characteristic of most of the sandstones of this formation. The sandstones, where best developed, are full of them. They are a silicate, containing much oxide of iron, probably a detritus of hornblende slates or similar rocks. By the atmospheric influences they are decomposed, and the oxide of iron then changed into peroxide of iron, gives the sandstones first a dirty gray, then a yellowish, and ultimately a dark brown color. This sandstone was interstratified with gray and ferruginous slates, and below it indications of coal were found.

On Trappes creek was an outcrop of coal near the road. It was of

inferior quality, as it cannot be expected otherwise of a coal exposed for many hundred years, to the open air. Where it is covered by the rocks, it will certainly be found as good as that from other localities. The thickness of this bed could not be measured, but does not probably exceed two or three feet. No fossils were found there, but the similarity of the lithological character of the rocks with those of the North Platte river does not leave any doubt that they are of the same cretaceous period. The dip of the strata was not uniform, generally a few degrees off the mountains. Further northwards they seemed to be horizontal; thence in many places the brown shale was forming; the soil and sandstones were exposed in the hills. I also noticed many indications of coal, but found none in position.

In speaking of the Medicine-Bon butte, I have already mentioned that south of this mountain, near Camp 42, a highly fossiliferous sandy limestone was heaved up under an angle of 45 degrees. It contained many fossils.—Ammonites, (Scaphites Mandanensis,) Acepala—and remains of fishes, which were found to be of cretaceous age. I have stated also that north of the butte, near Elk creek, some strata were much disturbed, and others nearly horizontal. In these ostrea congesta were noticed, a fossil common in the cretaceous strata on the lower Republican river, and on Sage creek, near Bryan's pass.

Between Elk creek and Medicine-Bon creek I found heavy layers of a whitish sandstone with the green particles mentioned above, which, though soft, withstands well the atmospheric influence. It was overlaid by a dark brown soft sandstone in some places, capped by a highly compact sand rock, with a strong silicious cement and a somewhat splintery fracture of a greenish gray color; on the outside brown by disintegration. On Medicine-Bon creek, below Camp 51, the bluffs were composed of sandstones, interstratified with gray argillaceous slates and shales, and the brown sandy argillaceous shales described above. I noticed three several small seams of coal from two to twelve wide, and they are undoubtedly the same strata that were exposed in the bluffs of the North Platte river, near Camp 48. East of that locality, towards Aspen creek, more sandstones were noticed, of which some were highly ferruginous, and some shales.

The upper portion of this formation was best exposed in the bluffs of the upper North Platte, above Camp 44. There were high sections of light gray fine-grained sandstones, interspersed with ferruginous concretions and thin layers of ferruginous sandstones, white chalky limestones, and sandy shales. In places this sandstone became greenish by an abundance of the greenish particles, or yellowish by their disintegration. Some layers of a compact sand rock, with a strong silicious cement and splintery fracture, were also noticed. Below Camp 44 lower strata were observed. They were coarser sand, but presented the same lithological character. They were all light colored sandstones, with many greenish particles, which by their decomposition had made many of the strata impure gray, yellowish, or brown. The bluffs formed by these rocks presented high escarpments with perpendicular walls, receding from the river in terraces, the top of each of which was generally made up of a layer with a stronger sili-

ceous cement. No interstratifications of slates were noticed in these sections.

Lower down the river, near Camp 48, the middle division of this formation was well exposed, made up of similar sandstones, interstratified with some argillaceous slates, brown and gray argillaceous and sandy shales, and layers of coal. On the western side of the river a highly fossiliferous sandstone and sandy shale were observed, containing *inoceramus*, *ostrea*, &c., and below it a seam of coal eight inches wide. Opposite the mouth of Sage creek more coal was found. I noticed in the bluffs at least eight different strata, from six to twenty-four inches wide, and by an extensive examination more, and perhaps thicker strata, would probably be discovered. Fissures in the sandstones were filled with crystals of gypsum and a salt similar to that from the ponds on the Laramie plains, composed principally of sulphate of magnesia, with some chloride of magnesium. In the upper part of the bluffs east of the river I found many impressions of a small shell which could, however, not be identified. These strata were exposed also on Sage creek and near Bryan's pass, the sandstones forming prominent layers in the rocky bluffs north of the creek.

The lower division of the formation on which argillaceous slates and shales prevail already forms the base of these bluffs, and, caused by the general dip of some degrees towards the northeast, rises towards the southwest, and composes the mountains south of the head of Sage creek. On this creek more fossils were found, and many crystals of gypsum, disseminated in the rotten outcrops of the slates. In the dark bluish and gray slates south of Camp 45, I noticed, besides imperfect impressions of other fossils, many *ostrea congesta*, generally fixed, as I found them in other places, on pieces of calcspar with a fibrous texture, apparently from fossil shells, of which several genera present that peculiarity, among them the *inoceramus*.

Above the slates, near the top of the ridge, sandstones were still noticed, especially a highly silicious compact rock, with a splintery fracture; and below it some small layers of a fine-grained white sandstone, and a conglomerate of white and yellow sand, with pebbles and small boulders, the detritus of which covers the ridge to a considerable extent.

I did not observe any coal near Bryan's pass and on Sage creek; but, as the strata are the same as the lower ones on Platte river, it will certainly be found there if search is made.

The description Captain Stansbury gives in his report of the country west of the pass and along Bitter creek, induces me to believe that the same formation is found there, extending at least as far as Green river. He also found coal there at several localities, as I have mentioned previously.

Describing this formation in three divisions, I have only considered its local development, but did not intend to indicate that the single portions represented different main subdivisions of the cretaceous period, as they are arranged in the works on geology. The sandstones are an excellent building material, and the clays and shales will make good brickstones. The sandstones, decomposing into a loose coarse sand, make a sterile and the slates and shales a wet and

cold soil, which latter produces a most luxuriant growth of artemisia, but few other plants. By a mixture of the sand and clay the soil is somewhat improved, but the country is altogether too much elevated to be of value for cultivation. Mr. Marcou, on his new geological map, mentioned previously, describes this part of the country also as triassic and jurassic, like that on Pole creek and Main Platte river; but there is not the slightest similarity between these countries, and he is as wrong in the one as in the other case. It is not necessary to enter into a discussion on that subject, because the most recent explorations of that part of the country where Mr. Marcou thought to have found the triassic and jurassic formations, near the 35th parallel, prove that only different divisions of the cretaceous formation are there developed, and that therefore all the conclusions based on his discovery are erroneous.

Herewith, concluding the description of the geology of the surveyed route, I subjoin the account of the results obtained by Dr. B. F. Shumard from the study of the collection of fossils submitted to him.

HENRY ENGELMANN.

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## PALEONTOLOGY.

BY B. F. SHUMARD, M. D.

ST. LOUIS, *January 14, 1856.*

DEAR SIR: I herewith enclose a catalogue of the fossils collected by you while attached to the government expedition under Lieutenant Francis T. Bryan, and which you have submitted to me for examination. They represent very distinctly several geological periods, namely, the Carboniferous, Devonian, and Cretaceous. All the fossils obtained between Fort Leavenworth and the Republican fork of Kansas river, (thirty-two miles west of Fort Riley,) belong, unequivocally, to the coal measures or upper part of carboniferous system. They, therefore, indicate an extension of the coal formation into the Territory of Kansas for the distance of about one hundred and ten miles west of the Missouri river. This forms a continuation of the Missouri coal field, in which Professor Swallow has demonstrated the existence of extensive and valuable beds of coal.—(*See Geol. Report, Missouri.*) With some local exceptions, all the fossils found between the ninety-seventh degree of longitude and the Medicine-Bon butte, belong to the cretaceous period, and both the upper and lower divisions of this group, as they occur in Nebraska, are represented in your collection. The specimens from the metamorphosed, silicious strata on the north side of Medicine-Bon butte are paleozoic types, belonging to the genera *Spirifer*, *Chonetes*, *Orthis*, *Orthoceras*, *Conocardium*, &c. They were very badly preserved, and their specific character almost wholly obliterated. From their general appearance, however, I am strongly of the opinion that they represent the Devonian period. The compact, gray, drab, and purple altered limestones with encrinital re-

mains, from the Black hills, between Camps 36 and 38, resemble very closely, in their lithological characters, some of the upper silurian strata of Missouri, and they are doubtless of the same age.

Very respectfully, your obedient servant,

B. F. SHUMARD.

Mr. ENGELMANN,

*Geologist of the survey of a road from  
Fort Riley to Bridger's Pass.*

### *Fossils of the coal measures.*

#### BRACHIOPODA.

PRODUCTUS SPLENDENS, *Norwood & Pratten*; Jour. Acad. Nat. Sci. Philada.; new series, vol. 3, p. 11, p. 1, fig. 5, a-d.

The collection contains three specimens of this very characteristic species of the coal measures. They are labelled thirty-eight miles west of Fort Leavenworth, between Grasshopper and Mud creeks, and near Little Vermillion creek, Kansas Territory.

PRODUCTUS VILLIERSI? *D'Orbigny*; Koninck, Monog. Gen. product et Chonetes, p. 109, pl. xi, fig. 1, a-c.

Between Grasshopper and Mud creeks, and a short distance west of Mud creek, Kansas Territory.

PRODUCTUS NEBRASENSIS, *D. D. Owen*; Rep. Geol. Surv. Wisconsin, Iowa, and Minnesota, p. 584, tab. 5, fig. 3.

Same locality of the preceding species.

PRODUCTUS AEQUICOSTATUS, *Shumard*; Geol. Surv. of Missouri, second report, p. 201, pl. 6, fig. 10, *P. Cora*. *D. D. Owen*, Geol. Rep. Wisconsin, Iowa, and Minnesota, tab. 5, fig. 1, (not of *D'Orbigny*.)

All the specimens of this species are from Fort Riley, K. T.

PRODUCTUS SEMIRETICULATUS, *Mart. sp.*; Petrif. Dub. pl. 32, fig. 1-2, and pl. 33, fig. 4. *D. Koninck*, Monog. Gen. Prod. N. Chonet. pl. viii, fig. 1, a-m, and pl. x, fig. 1, a-d.

Near mouth of Big Blue river, Fort Riley, and ten and twenty miles west of Fort Riley, Kansas Territory.

CHONETES SMITHII, *Norwood & Pratten*; Notice Chonetes of West. States, Jour. Acad. Nat. Sci. Philad., new series. vol 3, p. 24, pl. 2, fig. 2, a-c.

Kansas Territory, between Grasshopper and Mud creeks, in coal measures.

TEREBRATULA? SUBTILITA, *Hall*; Stansbury's Exped. Great Salt Lake, p. 409, pl. 2, figs. 1, a-b, and, 2 a-b.

Coal measures, ten and twenty miles west of Fort Riley, Kansas Territory.

SPIRIFER-PLANO-CONVEXA, *Shumard*; Geol. Surv. Missouri, second report, p. 202.

Eight miles west of Fort Leavenworth, Kansas Territory.

SPIRIFER MEUSEBACHANUS, *F. Roemer*, Kreidebild, von Texas, p. 88, taf. x, fig., 7 a-c. *Spir. triplicata*, *Hall*, (non *Kuterga*.) *Stansb.*

Exped. Great Salt Lake, p. 410, pl. 2, fig. 5, a-c. *S. fasciger*, D. D. Owen, (non Keyserling,) Geol. Rep. Iowa, Wis. and Minn., tab. 5, fig. 4.

Thirty-eight miles west of Fort Leavenworth, Kansas Territory.

*S. KENTUCKENSIS*, *Shumard*; Geol. Surv. Missouri, second report, p. 203.

Coal measures, eight miles west of Fort Leavenworth, Kansas Territory.

*RYNCONELLA*, (*sp. undet.*)

Thirty-eight miles west of Fort Leavenworth; it appears to be identical with an undescribed species found by Professor Swallow in the coal measures below Council Bluffs, on the Missouri river.

*ATRYPA*.—A minute species with fine striae. The single specimen collected is too imperfect to permit a clear recognition of its character. Occurs with the preceding.

*ORTHISINA UMBRACULUM?* *Buch. sp.* Über Detttyris. p. 69, tab. 1, figs. 5 and 6. Owen Geol. Rep. Wis., Iowa and Minn., tab. 5, fig. 14.

It is quite doubtful whether the American shell, referred by most authors to this species, is really identical with that described by Von Buch. Nevertheless, it is a closely allied form, and a strict comparison with authentic examples from Europe seems necessary to enable us to determine the question satisfactorily.

Coal measures east of Lost creek, Kansas Territory.

#### ACEPHALA.

*MYALINA SUBQUADRATA*, *Shumard*; Geol. Surv. of Missouri, 2d Rep., p. 207, pl. C, fig. 17, a-b.

Wild Cat creek, six miles west of Manhattan city, Kansas Territory.

*MYTILUS ENGELMANNI*, (*new sp.*)

Shell small, equi-valve, inequilateral, increasing in width posteriorly; length about double the height; anterior extremity very short; beak obtuse, rounded, terminal; hinge line straight, not quite equal to one-half the length of the shell; upper and posterior borders regularly arched; inferior border straight; umbo obtusely subangulated, sloping abruptly to the inferior border; surface marked with very fine concentric striae of growth.

Length 6 lines; greatest width 3 lines; thickness  $2\frac{1}{2}$  lines.

Several detached valves of this species were found with *Productus Nebrascensis* and *Fusulina cylindrica* in the gray limestone of the coal measures, on the route between Grasshopper and Mud creeks, Kansas Territory.

Dedicated to Mr. H. Engelmann, the geologist of the expedition.

*ARCA*, (*sp. undet.*)

Occurs with the preceding species.

*PECTEN OCCIDENTALIS*, *Shumard*; Geol. Surv. Missouri, 2d Rep., p. 207, pl. C, fig. 18.

Between Vermillion and Blue creeks, Kansas Territory.

*AVICULA*, (*sp. undet.*)

Thirty-eight miles west of Fort Leavenworth, Kansas Territory.



the route finally adopted. This contract met with disapproval from the War Department, and new advertisements, calling for proposals on all routes, were issued. Mr. L. J. Tower presented the lowest bid, and a contract was accordingly entered into with him, the time of fulfilment expiring on the 1st of November proximo. Subsequently a second contract was awarded to Mr. Tower for the construction of the route lying between Henness and Yelm prairie. The first contract comprises about 25 miles, and is almost, if not entirely, fulfilled at the present date; the second contract comprises about 8 miles, and is in rapid progress, and will doubtless be completed by the 1st of November. By the date just referred to there will be a good ordinary road from the Cowlitz plains to Fort Steilacoom, and the balance of the original appropriation remaining on hand will be about \$10,000.

The next step to be taken on this route is, to continue the road to the Columbia river. At present there are no good means of communication between the Columbia river and Puget's Sound. The route chiefly travelled is by the Cowlitz river, and by canoes. In seasons of high water great quantities of huge drift descend the river, carried along rapidly by the strong current, rendering navigation often dangerous and, occasionally, impossible. During the same period several miles of the trail up the Cowlitz are overflowed to the depth of several feet, thus cutting off communication between the two sections, or rendering it extremely difficult. It is possible, by following the west bank of the Cowlitz, to avoid the river altogether, and to locate a route which, at all points, will be above the highest water mark. Steep grades will be encountered, but they can be made very practicable. The country for the greater part of the way is heavily timbered.

The route above described is the mail route, by which the greater portion of the inhabitants of Washington Territory are supplied; it is also the channel of travel to Oregon, California, and the eastern States. Owing to the expense attending canoe navigation on the Cowlitz, freights are so high as to prohibit all traffic, except what is necessary for the actual wants of the inhabitants. The tariff from the Cowlitz landing to Monticello, a distance of 30 miles, is \$40 per ton. This operates to the great detriment of all farmers on the Cowlitz plains. In a military point of view, it is of great importance that there should be a good road over this route. In case of an emergency requiring a movement of a large body of troops from Oregon to the Sound, with the present facilities for transportation, long and vexatious delay would necessarily occur.

For the reasons thus briefly set forth, it is respectfully recommended that an additional appropriation be asked for, which, in addition to the balance on hand, will be sufficient to construct a good road from the Cowlitz plains to Monticello, a distance of thirty miles. The amount estimated for is \$15,000.

### III. MILITARY ROAD FROM COLUMBIA BARRACKS TO FORT DALLES, OREGON TERRITORY.

This work was almost completed when First Lieutenant Derby, topographical engineers, relinquished charge of it. It was continued



to completion and the force discharged on November 23, 1856. Subsequently, in the same month, a few men were engaged in removing the slides for several days. During the heavy rains of winter, a portion of the roadway, about one hundred feet in extent, which lay along the almost vertical declivity of a high bank, and was supported by a crib-work of logs let into the bank, owing to the heavy slides from above and to the softening of the soil by the rains, gave way, and was precipitated to the foot of the hill, thus cutting off communication by the road between the two extremes of the portage. As early as the weather would permit, the work of repair was commenced. The surface of the road, from one extreme to the other, was much cut up by the travel of wagons during the winter; and in and near the road were found issuing many springs, which entirely disappear during the dry season.

The balance of funds was expended in rebuilding the crib-work, draining the surface of the road, and in planking those portions which, during the previous winter, had been most difficult for teams. The same causes which produced slides will probably reproduce them, and if they are as large as some have been, it is not improbable that the road will be carried away a second time. With the means at disposal, no other plan in repair was left but to support the roadway with logs let into the bank. As it exists at present, there is an excellent summer road; the heavy rains acting upon the clayey soil must produce mud, but with the corduroying and gravelling which have been done, it is expected that the road will be found much better during the coming winter than during the last.

The quartermaster's department have made use of the road ever since its construction, several teams being constantly engaged in transportation. A six-mule team can haul two tons over it; and as the rate of transportation of the private company over the portage is \$15 per ton, and as a team can easily make two trips per day, it will readily be seen that the public interests are much advanced by the construction of this road.

#### IV. ROAD FROM STEILACOOM TO BELLINGHAM BAY, WASHINGTON TERRITORY.

On July 22d notice was received that the amount of the appropriation for this road, by the act of March 3, 1857, was placed to my credit with the United States assistant treasurer, San Francisco.

On August 2d I left Portland to make arrangements for the reconnaissance. Mr. W. W. De Lacy was engaged to take charge, and started from Fort Steilacoom on August 12th.

A portion of the country traversed by this route is unexplored, and it is only known that the whole country is densely timbered. The parts previously explored presented so many difficulties, particularly on account of fallen timber, that it was deemed advisable to dispense with pack-animals and substitute Indians. Accordingly, six Indians were employed to pack provision, and arrangements were made to supply the party by canoes in the Snohomish and Skaget rivers.

Reports from Mr. De Lacy, at Seattle, some thirty-five miles from Steilacoom, indicate that the arrangements are judicious, and it is

expected that by October 15th the surveyor will have returned to Steilacoom to prepare the maps and memoir.

He has been instructed to make a reconnoissance merely, using a Schmalcalder's compass, and estimating the distance by steps. He will return over the route, marking clearly the line.

#### V. ROADS IN SOUTHERN OREGON.

It has not been in my power to visit the lines of operations of these roads. It is suggested that the two roads, viz.: Camp Stewart to Myrtle creek, and Myrtle creek to Scottsburg, should be assigned to one officer.

They are too distant from this point, and the facilities for reaching them too poor, to be under the direction of an officer whose attention is frequently requisite on roads on Puget's Sound.

Respectfully submitted.

G. H. MENDELL,

*First Lieut. Topographical Engineers.*

Major HARTMAN BACHE, *Topographical Engineers,*

*Superintendent Military Roads, San Francisco, California.*

#### APPENDIX K.

KEOKUK, September 28, 1857.

SIR: I have been delayed in handing in my annual report on the "improvement of the Rock River and Des Moines rapids of the Mississippi river" by absence in the pursuit of machinery.

Last year's operations have been fully reported heretofore, and the proceedings in relation to a contract under the appropriation, approved August 16, 1856, have been fully laid before the department, and have resulted in an order to me to prosecute the work, under paragraph 944, Army Regulations.

This order was received in July, since which time I have been much occupied devising and getting up machinery deemed best calculated for the most efficient prosecution of the work.

This machinery has been built and has been shipped from Troy, New York. It consists of an excellent description of pile-driver machinery, which lifts and drops a steel-pointed iron chisel, weighing twenty-nine hundred pounds, from any desirable height, and will strike about three blows to the minute.

The chisel, being about twelve feet long, will work at any stage of water upon the rapids, and at all seasons except during ice.

I entertain the highest confidence in the good results from this machinery. Two of the boats designed to carry the machinery are now ready, and that portion which has arrived is being put up. The rest is daily expected, so that I hope to put this at work by the 20th day of October, and I may be able to report the results before the

ice sets in. Difficulty and delay has ensued in obtaining suitable lumber.

Amount of expenditures from the 30th June, 1856, to the	
30th June, 1857.....	\$19,622 48
Amount of probable expenditure to September 30, 1857...	30,000 00
	<hr/>
	49,622 48
	<hr/>

Required for Rock Island rapids for next year, or season...	\$100,000 00
	<hr/>
	<hr/>

The contractor (Hager) made early preparations this spring to resume work under existing contract. The season proved unusually backward, accompanied by an early rise in the river, which did not subside sufficiently to commence work until August, at which time he resumed work, and has been prosecuting it zealously, and to the best advantage.

The river has not subsided to low water this season, remaining constantly a foot or more higher than the last season, and is now rising, with no probability of low water.

This necessarily retards the operations of the contractor, and, from present appearances, I doubt whether he will quite exhaust the balance of the appropriation under which he is working.

I am, sir, very respectfully, your obedient servant,

J. G. FLOYD, *W. S. Agent.*

Colonel J. J. ABERT,

*Chief of Bureau Top. Eng'rs.*

## APPENDIX L.

ST. LOUIS, MISSOURI, December 15, 1856.

SIR: By instructions from the War Department, dated Washington city, May 28, 1856, I was placed in charge of the location and construction of the territorial road in Nebraska Territory, connecting New Fort Kearney and a point of the Missouri river, opposite Council Bluffs, Iowa.

In the execution of that duty I proceeded to St. Louis, Missouri, where I arrived on the 1st of June, and received from Lieutenant Francis T. Bryan, topographical engineers, the funds in his hands appertaining to the road, and such instruments as were required to make the survey. I engaged two assistants and most of the laborers that it would be necessary to take out with me; procured from Major Ramsey, ordnance department, arms to equip the party, and on the 6th left for Fort Leavenworth, having previously made a requisition on the quartermaster at that post for such transportation as would be needed.

On my arrival there I received from Major Sibley five wagons and teams, twelve riding animals, and camp equipage; and from the commissary department forty days' rations for the party. On the 17th I left for Omaha city, having received your instructions to commence

the survey at the eastern end of the line. I crossed the Missouri river at Weston and marched up through Missouri and Iowa to Council Bluffs, where I recrossed the river, and arrived at Omaha city on the 26th of June. I remained there four days, engaging a guide, collecting information in regard to the route, and getting some levelling rods made, the only one I started with having been broken by the upsetting of a wagon between Fort Leavenworth and Council Bluffs.

On the 1st of July I commenced the preliminary survey, using the compass and odometer, intending only to make a hasty reconnaissance, selecting the best points for crossing the streams, and on my return to connect these points by the most practicable route. I crossed Big and Little Papillon on what is known as "Winter Quarters trail," the route usually pursued by Mormon emigrants, and struck Elkhorn river, eighteen miles above its junction with the Platte, and at a distance of twenty-four miles from Omaha city.

Between the Missouri and Elkhorn rivers the country is a high, rolling prairie, elevated three hundred feet above the Missouri river, and is very much broken by ravines, which attain a depth of from thirty to one hundred and forty feet below the general level. The two Papillon creeks are small streams with high banks, but, excepting for a short time after a freshet, there is very little water in them, the supply being mostly from springs issuing from their banks. Elkhorn river has an average width of about two hundred feet. It is surprisingly tortuous, with a rapid current, sandy bed, and low, sandy banks, which overflow and are subject to great changes. Very considerable annual alterations of its bed are evident. On the east side it runs near and in places washes the bluff; on the west the valley of the Platte borders on it for thirty miles above its mouth. It is only where the river runs near the bluff that its banks are sufficiently permanent to erect a bridge with any reasonable prospect of its standing. I examined the stream for several miles on either side of the crossing, with a view of selecting the best location for a bridge, but could find no point that presented equal advantages with the location selected. On the eastern side, at this point, the approach to the valley from the high ground is very good in its natural condition, and the bank is high and relatively quite permanent; but on the west side a roadway, to serve also as a guard bank, of from two to six feet in height, will have to be thrown up for a distance of three-quarters of a mile from the bridge.

Crossing this stream, I came on the Platte or Nebraska river, thirteen miles distant, and continued up the north side of it, touching the points of timber growing on its banks, till I came to the Loup fork of the Platte, four miles above its mouth. This is a wide, shallow stream, with a rapid current and low sandy banks, which, however, do not appear to be inundated during freshets. I had no means of examining its bed to a depth exceeding twelve feet, but to that depth, and I have no doubt to a much greater, it is quicksand—the iron rod with which I made the examination sinking into it with but slight pressure. There are strata three or four feet apart, differing somewhat in firmness; but still it is all a loose sand, the specific gravity of which is but little greater than that of water, and is ready to move with the slightest increase of the current in which it has for

the time become deposited. On account of this loose character of the soil the bed of the river has changed for miles in many places, and there is no permanency about its banks. These former beds are now miry sloughs, making the river inaccessible on the south side, where they occur more frequently than on the north. Its width is about a thousand feet. Bridging it at any reasonable cost is impracticable, and could only be done by using stone freely to protect the piers and abutments, and no indications of stone have been discovered in the vicinity. A ferry has been established on it near its mouth to facilitate the Mormon emigration, but sand bars originate rapidly, and interrupt the crossing. In going to Fort Kearney the ferry was good, but on returning, twenty-five days afterwards, sand bars had formed, and the wagon train was gotten over by the men wading by the side of the boat, winding about among the bars, hunting out the deepest water. The only thing that can be done here is to improve the ferry by driving piles and throwing up a bank, confining the channel to narrower limits, thereby producing a current in which sand bars will not form. The banks wash so readily that, without they were protected with stone, it is doubtful whether even this would succeed.

I continued up the south side of the Loup fork fifty-seven miles, when I left it, and, marching twenty-three miles across the range of high broken sand hills intervening between it and the Platte valley, I struck Prairie creek. This creek meanders through the Platte bottoms for eighty miles. Where it is first met with after leaving the Loup fork it is a pretty little stream, with clear, deep water and a rapid current, without trees, shrubs, or hills to indicate the presence of a watercourse. I continued up it twenty miles. Before leaving it its banks became high, with a continuous short growth of ash and elm on their slopes. The volume of water is also greater here than it is lower down. Before reaching the Platte the water disappears for the greater part of the year, sinking in the quicksands, which prevail in this valley at a depth of from six to ten feet below the surface. This disappearance of the water is not a peculiarity of this creek, but is common to all the small tributaries of the Platte in this section of its valley. While their beds are dry and overgrown with grass and weeds near their mouths, they are running streams towards their sources.

Leaving Prairie creek, I crossed Wood river twenty-five miles above its mouth. For thirty miles its direction is nearly parallel to that of the Platte, and about five miles from it. Its banks are high, but gradually decrease towards its mouth, and these slopes are covered with a short growth of ash and elm. I kept up Wood river six miles, and then diverging to the left, again struck the Platte river near the head of Grand island.

After examining the river I found that, on account of the quicksand, crossing the train would be attended with difficulty; I did not attempt it, but moved down the river, and encamped opposite Fort Kearney.

From the crossing of the Little Papillon I pursued very nearly the route over which the Mormon and California emigrants have been passing for several years. It is said that the early travellers continued



up the immediate valley of the Platte, instead of diverging to the north and going up the Loup fork, but all traces of the road have disappeared. The greater part of the route out was good, but is less direct than is desirable. Along the Loup fork there are few good camping grounds. The valley, which is from three to five miles wide, is cut up with miry sloughs, forcing the road to keep near the foot of the bluff, where neither wood nor water can be conveniently procured. After leaving the Loup fork there is an interval of thirty miles without water during the dry season, and forty miles without wood. The high country passed over is sandy and very broken, making the road heavy.

I remained in camp four days before starting on my return. From information obtained from the interpreter at the fort, who had lived many years among the Pawnee Indians, and from the Pawnees themselves, who inhabit the country through which the road is to pass, and who were encamped near the fort, I was satisfied a shorter route could be obtained by going down the Platte. The information was vague and indefinite, but I determined to examine the route before making the location.

From the changeable nature of the fords on the Platte, I made no location with reference to crossing it, but surveyed a line due north from the fort for three miles, which took me to the rising ground on the north side of the river. From this point the line strikes Wood river, nine miles from the fort, and continues down it to near its mouth, where a good ford is found. The bed of the stream is firm, and the banks low. No high water marks could be ascertained; but from the position of the ford it is evident high water could never delay teams in crossing for more than a day or two, if at all. From Wood river I continued down the Platte, crossing Boovis and Prairie creeks, and struck our outward trail in the valley of the Loup fork, four miles above where I had crossed it in going up. To this point the Platte river line is twenty-six miles shorter than the other, and is superior to it in every respect. It affords good points for camping grounds, from five to fifteen miles apart, with an abundance of wood, water, and grass; and the necessity for bridging Wood river and Prairie creek is obviated. Prairie creek and Boovis creek, a small stream thirty-five miles below Wood river, can be crossed by a corduroy. Bridging would be preferable, if there was any probability that the bridges would remain standing, but all along these streams there is a luxuriant growth of grass and weeds, which are annually burnt. As soon as the timber of the bridges became seasoned, they would be consumed by the prairie fires, as they would be far from any habitation, and there would be no one feeling a special interest in their preservation. The crossings will be prepared by excavating the beds and approaches about two feet deep, and in this placing a substantial corduroy, covering it with brush and earth, and securing the logs firmly in their position. There will be no danger from flood or fire to crossings thus constructed, and I think they will serve as good a purpose as bridges, and be much less expensive.

From the point of intersection of the two surveys to the Elkhorn river, a distance of sixty-three miles, the route was very nearly the

same as that pursued in making the preliminary survey. With the exception of a few unimportant sloughs, the line occupies a very good natural roadway, crossing Shell and Rawhide creeks, which are to be bridged. Between the Elkhorn and Missouri rivers the county is so broken that it necessarily follows the dividing ridges. The ravines putting into the Elkhorn, the two Papillons and the Missouri, are numerous, and interlock at their heads, making this a very circuitous route. An approximately straight road could not be obtained without heavy grading, which the appropriation would not justify, nor will the travel on the road be sufficient to demand it.

In making the location the transit was used. The route was chained, and stakes driven at intervals of five hundred and twenty-eight feet. The level was also used. The entire length of the road is one hundred and eighty-nine miles, and the difference of level is eleven hundred and sixty-four feet.

During the course of the survey observations were frequently taken to determine the variation of the needle, which was found to be at Fort Kearney  $14^{\circ} 55'$ , and at Omaha city  $11^{\circ} 24'$  east.

There are a few points where the position of the line was not definitely determined, and which will require to be re-located. This can be advantageously done by the officer who goes over the route next summer in charge of the working party. He will be on the ground early in the season, and before the grass becomes so high that the most eligible route cannot be easily discovered.

The Platte river is from a half to three miles wide. The channel is filled from the mouth up with islands, many of which are large. The river is seldom confined to a single channel, but in many places it has as many as eight or ten. This is particularly the case in that part of the river occupied by what is known as "Grand island," which extends from eight miles above Fort Kearney to sixty miles below it. These channels, varying in width from thirty to three hundred yards, separate and come together again at short intervals, thus forming an infinite number of small islands which, taken together, are called Grand island. The bed of the river is a mass of moving quicksand. It has an average fall of about six feet to the mile, producing a rapid current, causing extensive washing of the banks. The average depth of water does not exceed two feet, and the range between high and low water mark, owing to the width of the stream and the rapidity of the current, is small—probably not exceeding three feet. It is not, and never can be made available for the purposes of navigation for vessels of the lightest draft. Being shallow, and cut up into channels, ferries cannot be established on it, and it forms an impassable barrier rather than a public highway. Fording is difficult at all points; the best one found is sixty miles below the fort, near the foot of Grand island, where the several channels come together. The stream is wide here, but the water is shallow, and the bed comparatively firm. Opposite Fort Kearney there are three principal fords, but there is no permanency about any of them. Where a good ford is found to-day it may be impassable to-morrow. Freshets, and the winds prevailing for some days, from



the same quarter particularly, produce these changes, but they sometimes occur without any assignable reason.

The country embraced within the survey is destitute of timber, with the exception of what is to be found along the water courses. On the Missouri there is a considerable body of cotton-wood, and on the bluffs, near Omaha city and Florence, there is some black walnut, oak, and elm. On the Papellons there are a few scattering cotton-wood trees and willow bushes. Along the Elkhorn there is a continuous growth of cotton wood, occasionally interspersed with oak, black walnut, and elm. The Platte generally has timber along its banks. On the islands, and where it is protected by bayous and sloughs from the prairie fires, it is heavy. It is more dense and has a finer appearance along Grand Island than on other portions of the river. The timber of the Loup fork resembles that on the Platte. I saw no indications of stone or coal, though, near Omaha city, an inferior quality of limestone is obtained, which is there used for building purposes, and on the Elkhorn river, twelve miles above its mouth, there is a ledge of sandstone strongly marked with iron ore. Coal is said to exist near the mouth of the Platte.

The soil is fertile and susceptible of a high state of cultivation. The high prairie between the Missouri and Elkhorn rivers has a rich, light soil, but much of it is so broken that it cannot be cultivated. West of Elkhorn the Platte valley is entered. This valley is from five to twelve miles wide and is bordered on either side by well defined bluffs. The southern bluff is higher and more abrupt than the northern, rising from fifty to two hundred feet above the river, which generally runs near and frequently washes it. Towards the head of Grand Island these bluffs measurably disappear and the valley becomes narrower. The space included between the bluffs is uniformly level and covered with a rich black loam.

Indian corn, small grains, and vegetables, are being cultivated successfully as far west as Shell Creek, and would undoubtedly succeed in other portions of the valley. A luxuriant growth of nutritious grass prevails throughout the Platte country, which will afford good grazing during the summer and allow the husbandman to provide a supply of hay for winter uses, and of a quality but little inferior to that made from cultivated grasses.

This portion of the Territory is fast settling up with an industrious and enterprising class of pioneers. Pre-emption claims have already been located on all the timbered lands along the water courses as far west as the Loup Fork, above which the Indian title has not been extinguished. But the scarcity of timber, stone, and coal, and the remoteness of the country from a market other than home consumption will operate against its ever becoming thickly settled.

I saw no Indians on the route. The Pawnees, who have their villages on the banks of the Platte, where they winter, had gone out on their summer hunt to provide their winter supply of buffalo meat. They had met with some Sioux or Cheyennes, with whom they are at war, and becoming alarmed took advantage of their vicinity to Fort Kearney for protection, and were encamped in the neighborhood to the number of thirty-five hundred. The day after my arrival; I was

present at a council which Captain Wharton held with the chiefs and principal men. They complained that their Great Father, the President had purchased from the Omahas and Otoes lands claimed and rightfully belonging to them, without investigating their claims, and that now a road was being run through their possessions without their consent and without their having been paid for the privilege, as had been done with other Indian tribes. They said my party should not be molested in locating the road; that they would trust to the justice of their Great Father to compensate them for their concessions. At the same time they seriously objected to the road. They had observed that roads always brought white men, who chased away the game, which has already become too scarce to furnish them a supply within the limits that have been prescribed for them. Other Indians depredate on trains passing over these roads, the blame of which they have to bear, and it is constantly involving them in trouble.

The survey was completed on the 14th of August, and on the 16th, having discharged a part of the men, I started with the train and extra animals to Fort Leavenworth, and turned them over to the quartermaster's department. On the 26th, having stored the instruments and other public property belonging to the road in the quartermaster's store-houses, I discharged the remainder of the party, and started to St. Louis with my assistants to draw the plans and prepare for the letting of the bridges.

A contract, which has been forwarded to you, has been entered into with Matthew J. Ragan, for bridging Omaha branch, the two Papelon creeks, Elkhorn river, Rawhide and Shell creeks, and for the grading on the west bank of Elkhorn. After paying for which, and defraying the expenses of the survey, there will be about four thousand five hundred dollars (\$4,500) of the appropriation remaining to expend on other portions of the road.

With this the officer in charge can take a small party and go over the route, improving the ford at Wood river, making the corduroy crossings of Bovois and Prairie creeks, and some of the worst ravines and sloughs.

The appropriation, when expended, will make a good wagon road for the greater part of the year. To render it passable at all seasons, an additional appropriation of about twenty-five thousand dollars (\$25,000) will be necessary, the line of the road crossing many small sloughs and low places which are at times overflowed, and which become miry after heavy rains. A little corduroy at the sloughs, and embankment across the low places, for which I submit an estimate below, would make them passable at all times, and I would respectfully recommend that an additional appropriation of twenty-five thousand dollars be asked for to complete the work.

The contractor has gone to Omaha to commence the work, intending to put up some of the smaller bridges this fall and winter; one of my assistants will be sent there to supervise the work, while the other will be engaged here on the map and profile of the route.

Messrs. J. H. Nelson and Benjamin Ebbitt, my assistants, have been zealous and efficient in the discharge of their duties.

Very respectfully, your obedient servant,

JNO. H. DICKERSON,  
*Captain United States Army.*

Col. J. J. ABERT,  
*Chief Topographical Engineers.*

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*Estimate of the cost of additional work required to make the road passable the entire year.*

For building small bridges, corduroy crossings, and culverts, and for embanking sloughs, and improving the grade of the road on division No. 1, from Omaha city to Elkhorn river .....	\$8,000 00
Division No. 2, from Elkhorn river to Shell creek.....	5,500 00
Division No. 3, from Shell creek to Loup fork, including the improvement of the ferry.....	9,000 00
Division No. 4, from Loup fork to Wood river, including the bridging of a large slough which the road now has to go around.....	6,500 00
	<hr/>
	29,000 00
Of the former appropriation, after paying the expenses of the survey and the work let by contract, there will remain, as stated above, to be applied on the items mentioned in this estimate, about.....	4,500 00
	<hr/>
Additional amount required.....	24,500 00
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APPENDIX M.

OMAHA, N. T., October 1, 1857.

SIR: The report submitted to the bureau of topographical engineers in December last by Captain J. H. Dickerson, assistant quartermaster, of the survey and location by him of the road (then under his charge) from a point (Omaha) on the Missouri river, opposite the city of Council Bluffs, to new Fort Kearney, Nebraska Territory, together with the map and profile of the road; and the plans for the bridges, also furnished the bureau by Captain Dickerson, seem to embrace all the information required by 1,224 paragraph of the regulations "for the corps of engineers and topographical engineers," of the surveys and work done upon this road, up to the 30th of June last, except the erection, previous to that date, of the bridges contracted for, as set forth in that report, over Omaha creek, Big Papillon creek, Little Papillon creek, and Rawhide creek.

Since the 30th of June the bridge provided for by the same contract has been erected over Shell creek, and the bridge over Elkhorn river, together with the embankment at its west end, is progressing, and will probably be completed within the contract time, the 30th of this month.

A bridge of twenty feet span, with a rise of eight feet, has also been built over Monroe creek, a mile west of Loup fork crossing, from timber cut on the ground or near it, by hired labor ; and also, one of sixteen feet span and nine feet rise over Prairie creek, from timber cut on its banks, and both secured from fire by deep trenches on either side, extending back sufficiently for the purpose, and by heavy embankments of sand thrown up against the abutments and covering the approaches.

Other small improvements within the appropriation will be made during the fall, leaving, at most, a balance of two or three thousand dollars unexpended on the first of January next.

The road will then, with the exception of the crossing of the Loup fork, be a good wagon road for all the dry season of the year ; but during the spring and June freshets short portions of it will be nearly, and at times quite impassable, especially in the valley of the Platte river, (in which nine-tenths of the road is necessarily located,) owing to the deep miry sloughs and swampy places, which cannot be avoided, and to the miry soil west of Elkhorn river for several miles, and to the overflow of the Rawhide and other small streams.

These overflows and bad states of the road occur, unfortunately, in April, May, and June, during the passage over it of nearly all the emigration going annually by the north side of the Platte river to our western coast, and are, consequently, the cause of much delay and loss to the emigrants and to settlers, and are serious obstructions to the mails of the country.

In submitting his report, last year, Captain Dickerson recommended an additional appropriation to that now nearly exhausted of twenty-five thousand dollars, for cutting ditches, throwing up embankments, grading and side cutting, and building small bridges and culverts at the points referred to on the road, and I have now the honor to renew that recommendation.

This appropriation will, if made and expended upon the road, make it an excellent one, except at the Loup fork crossing, at all seasons of the year.

This river, Loup fork, like all the shallow streams in this part of the country, has a light, miry, shifting, sandy bed, which, during high water especially, is constantly changing, so that where it is fordable one day it is impassable the next, or where it is most practicable to cross it with a ferry boat, one day the boat grounds, the next, in the middle of the stream ; compelling the discharge of loads into wagons, brought there across channels from the opposite shore, as shifting and difficult as those first crossed. And as it is impracticable for wagons or teams to stand still, even a short short time, anywhere in the river, without miring in the quicksands, the difficulties and labors and losses by emigrants, are very great, and can only be effectually obviated by the erection of a permanent bridge.

The river averages in width, for twenty miles above its mouth,

which embraces its principal crossing, about one thousand feet, with a depth ranging from six inches to six and eight feet. It is filled with innumerable islands and bars, which are being constantly formed and washed away ; and there is no point known at which a ferry boat can be crossed continuously from shore to shore. The banks are light alluvial soil, washing at many points, but no indications of extensive overflows are anywhere seen on its bottoms. There is but a very limited amount of drift wood cast upon its islands, and it is not probable that any heavy drift is brought down by it at any time.

It is believed, from the experience gained in driving the piles for the pier of the Elkhorn river bridge, which, like the Loup fork near its mouth, is in the Platte river bottom, and from the analogous character of the beds of the two streams, although the former is of much the least size, that piles would necessarily form the foundation for the piers of any permanent bridge crossing the Loup fork, and that if driven twenty-five or thirty-feet, they would afford a firm, unyielding support for a bridge over it. Cotton-wood timber for piles exists in great abundance near the crossing : but the timber for the superstructure must be transported by land from the Missouri river—a distance of eighty miles—making it, unavoidably, a very expensive bridge ; but it is believed that its importance will warrant the heavy expenditure in the preservation of the health and lives of the emigrants who annually cross the river, and are now exposed for days together in the stream, in crossing their teams and property—an exposure which seems to have been often followed by dysentery, cholera, and fevers, and has doubtless been one great cause of the multitudes of deaths which have so often occurred among emigrants in the pure air of these elevated plains.

The distance from the Missouri river to Fort Kearney by this road, when completed, will be one hundred and eighty miles, which is much less than by any other road.

I estimate the cost of material delivered, and of the erection of a bridge over the Loup fork, on the line of this road, at eighty-five dollars per running foot, or eighty-five thousand dollars for the whole bridge.

*Estimate of the cost of additional work required to make the road passable all seasons of the year.*

For bridging small streams, corduroy crossings, and culverts, and for ditching sloughs and for embankments, and for side cutting and improving grades.....	\$25,000 00
For bridging Loup fork.....	85,000 00
<b>Total.....</b>	<b>110,000 00</b>
Probable balance on hand, say.....	2,000 00
<b>Additional amount required.....</b>	<b>108,000 00</b>

I am, sir, most respectfully, your obedient servant,

E. G. BECKWITH,

*Captain Third Artillery.*

Col. J. J. ABERT,

*Chief of the Corps of Topographical Engineers.*

## No. 12.

## REPORT OF THE CHIEF OF ORDNANCE.

ORDNANCE OFFICE,  
*Washington, November 5, 1857.*

SIR: The following report of the principal operations of the ordnance department, during the past fiscal year, is respectfully submitted.

The duties of this department are to provide and furnish "ordnance and ordnance stores" of every description for the use of the regular troops, and for the permanent fortifications and other military posts of the United States; also, the annual supplies for arming and equipping the whole body of the militia. They include the preparation of estimates for these objects; the direction, under the sanction of the War Department, and the supervision of all expenditures therefor, and of all operations at the government armories and arsenals; the care and preservation of all military supplies and other public property at those places; the inspection and proof of all cannon, small arms, equipments, and ammunition purchased and fabricated for the government; the examination of all requisitions for arms or other "ordnance stores" for the regular troops and the militia; the ordering of proper quantities of them to the different points where wanted, with the transportation and delivery of those supplied to the States and Territories, and the enforcement of the proper and regular accountability for all property of this description belonging to the United States. The annexed statement D shows that these duties require for their prompt and efficient discharge two additional field officers and twenty lieutenants, and indicate the necessity of an increase of the ordnance corps to that extent.

As the operations of the past year, in the discharge of these duties, can be more conveniently stated, and more readily referred to by placing them under their appropriate heads, they will be so arranged in this report.

*Funds.*

Amount, as per last year's report, undrawn from the treasury on the 1st July, 1856.....	\$549,253 27
In hands of disbursing officers same date.....	93,151 33
Amount of appropriations for the fiscal year 1856-57, including the fixed annual appropriation for arming and equipping the militia.....	1,253,049 00
Received during the year for charges on account of damaged and lost arms, ammunition, &c., and from all other sources.....	146,059 30
	<hr/>
	2,041,512 90
	<hr/>

Amount of expenditures during the year.....	\$1,485,209 55
In hands of disbursing officers June 30, 1857.....	62,434 78
Remaining in treasury, undrawn, June 30, 1857.....	493,868 57
	<hr/>
	2,041,512 90
	<hr/>

The separate expenditures from each appropriation will be stated under the respective heads as they occur hereafter in this report. The accounts of the disbursing officers of this department have been all rendered, except in one instance, of a military storekeeper in California. His liabilities are less than \$500, and the failure to render his accounts is attributed by him to miscarriage or loss of mails. The attention of his commanding officer has been specially directed to his case, with instructions to require the accounts to be prepared, the balance due to be turned over to him, and to forward them to this office.

The estimates for the next fiscal year have been carefully prepared, and are restricted to such amounts as may be judiciously and economically applied to the legitimate purposes of the military service.

#### *Armament of fortifications.*

The expenditures from this appropriation, for the fiscal year, amount to \$192,390 11, and the principal articles procured by purchase and fabrication are as follows:

- 14 10-inch columbiads.
- 33 8-inch columbiads.
- 58 42-pounder guns.
- 10 8-inch columbiad casemate carriages.
- 34 42-pounder casemate carriages.
- 16 10-inch columbiad barbette carriages.
- 46 8-inch do. do. do.
- 90 42-pounder barbette carriages.
- 32 32-pounder do. do.
- 1 18-pounder do. do.
- 4 12-pounder do. do.
- 2 10-inch sea-coast mortar beds.
- 21 24-pounder coehorn mortar beds.
- 2 8-inch columbiad casemate upper carriages.
- 2 10-inch columbiad casemate chassis.
- 31 24-pounder casemate chassis.
- 22 24-pounder chassis for flank defence howitzers.
- 4 18-pounder barbette chassis.
- 2,500 42-pounder shot.
- 693 10 and 8-inch shot.
- 4,172 10 and 8-inch shells.

Extensive repairs have been made to the armaments of several of the forts, particularly to those in the harbor of Pensacola, as is more fully set forth in the report, hereto appended, of Lieutenant George



T. Balch, the officer to whom that duty was assigned. Additional supplies have also been furnished, during the year, for the armament of the permanent fortifications; they consist of 30 sea-coast and garrison cannons and 134 carriages of different calibres and kinds. There has not been sufficient time, since the authorization of experiments to test gun metals, to do more than make the preliminary preparations for carrying out these experiments. No results can, therefore, be now reported. The work is in hand, and in a good state of progress. In my last report I referred to the difficulty of keeping wooden gun carriages in a serviceable condition at ungarrisoned posts. Most of our permanent fortifications are usually without garrisons, and must continue so, unless there should be an adequate artillery force kept permanently at them. It is a question whether the maintenance of such permanent garrisons, independently of its other obvious military advantages, may not be a measure of true economy, by saving more, in the preservation of the armament and other public property at the permanent forts, than will cover the cost of the maintenance of an adequate artillery force at each. The substitution of wrought iron for wood as a material for gun carriages has been the subject of experiment. A carriage of iron has been devised and constructed, and is now undergoing all the various tests to determine the fitness, or otherwise, of the material and device, for the proposed purpose. So far it appears to answer well; but additional experiments are requisite to give such assurance as will authorize its adoption. I do not think, however, that any method can be devised so proper and efficient for the care and preservation of the permanent forts and their armaments, and at the same time so advantageous on military consideration, as the permanent maintenance of artillery troops at each, in such numbers at least as may be sufficient to keep in good order the valuable public property thereat. It is obvious that no structures, however faithfully made, or of whatever material, can be left uncared for and unlooked after without suffering damage; and it becomes a duty to inquire whether the economy which has sent our heavy artillery from their appropriate duties, to supply the inadequacy of the strength of other arms of service, may not have been the cause of loss, in the end, greater than any temporary saving of expenditure can justify on principles of true economy.

Every day's experience is more and more convincing of the necessity of a national manufactory of cannon and projectiles. The precautions which we are now compelled to adopt to insure, as far as possible, the use of none but safe and reliable material for the fabrication of iron cannon involve the same cost at each of the private foundries as would be required for a national armory of this kind. When multiplied by the number of private foundries where government cannon are made, and where the materials and manufacture have to be severally tested, the result shows a cost which forms of itself, exclusively of other manifest considerations, an ample argument in favor of a national foundry. This is a matter which has been fully investigated and frequently considered by Congress, and I believe there has been little, if any, diversity of opinion in regard to its expediency. The only question which has caused delay in the execution of the measure

is the location of the national armory for cannon and projectiles. There are undoubtedly many places, in different sections of the union, which possess advantages for an establishment of the kind. The requisites are abundance of material, (chiefly coal and iron,) easily and cheaply accessible, healthfulness of the locality, and facilities the transportation of heavy articles to and from. Any place possessing these requisites will answer the purpose; and, other things being equal, a central location in regard to the different permanent fortifications of the country would be preferable.

*Ordnance, ordnance stores, and supplies.*

There has been expended from this appropriation, during the fiscal year, the sum of \$228,248 79, and the principal articles procured by purchase and by fabrication at the arsenals are as follow, viz:

1	twelve-pounder bronze gun.
1	stone mortar.
23	field carriages, caissons and travelling forges
1	coehorn mortar bed.
200	Sharp's carbines.
310	repeating pistols, different patents.
100	six-pounder cannon balls.
62	eight-inch columbiad and mortar shells
304	thirty-two-pounder shells.
338	twenty-four-pounder spherical case shot.
800	infantry cartridge boxes.
799	" " box belts.
1,500	" waist belts.
1,367	bayonet scabbards, with frogs.
739	rifle sword-bayonet scabbards.
20	rifle sword waist belts.
777	carbine slings.
1,170	" swivels.
875	sword and sabre belts.
1,495	sword knots.
425	revolver holsters.
550	sets horse equipments,
4,331	saddle blankets.
170	saddles.
551	rounds of fixed ammunition for field artillery.
2,963,112	cartridges for small arms.
7,902,500	percussion caps for small arms.
4,986,500	Maynard's primers.
258,600	friction primers.
10,000	locks and breechpins.

The arms, equipments, ammunition, and other ordnance supplies which have been furnished for the regular service, during the fiscal year, are specified in statement C, hereto annexed.

With a view to ascertain the best pattern of horse equipments for the military service, this department has caused to be manufactured and put in service during the past year several hundred sets of the pattern selected by a board of officers of the mounted regiments, and

of the pattern known as Hope's saddle, and much used in Texas. Three hundred sets of Jones' pattern have also been ordered, and are now in process of fabrication. The use of these and the Grimsley equipments in actual service will afford the means of comparing their relative merits, and enable us to select for adoption the whole, or such parts of either, as experience may show to be the best adapted to the requirements of the service.

*Arming and equipping the militia.*

The expenditures from this appropriation, during the past fiscal year, amount to \$134,529 40. The principal articles procured by purchase and by fabrication at the arsenals are as follows, viz :

- 31 six-pounder guns.
- 12 twelve-pounder howitzers.
- 6 six-pounder carriages.
- 24 caissons.
- 962 Colt's belt pistols.
- 1,000 cavalry sabres.
- 1,000 artillery swords.
- 100 cadet's swords.
- 6,505 infantry cartridge boxes.
- 6,600 infantry cartridge box belts.
- 2,842 bayonet scabbards with frogs.
- 8,865 gun slings.
- 8,163 waist belts for infantry and riflemen.
- 5,896 cap pouches.
- 1,140 rifle sword waist-belts.
- 1,692 rifle pouches.
- 972 rifle cartridge boxes.
- 1,760 rifle, pouch, and flask belts.
- 200 carbine cartridge boxes.
- 2,630 sabre belts for cavalry and horse artillery.
- 1,000 sabre knots.
- 712 carbine slings.
- 1,737 pairs of holsters.
- 1,320 sword belts.
- 750 waist belts for sergeants.
- 2,000 copper powder flasks.

The apportionment of arms to the several States and Territories, according to law, and the supplies which have been furnished for the use of the militia during the past year, on requisitions of their governors, are set forth in the accompanying statements, marked A and B.

The work on the armory for the District of Columbia has been carried on, during the year, in accordance with the law and the appropriation. The building, except some requisite fixtures, has recently been reported ready for occupancy. It will be turned over for the use of the District militia as soon as these fixtures are put up, and arrangements for their care and preservation made.

*National Armories.*

The expenditures at these armories, during the fiscal year, have been as follows:

	Harper's Ferry armory.	Springfield ar- mory.	Total.
Manufacture of arms, appendages, tools, &c., and purchase of materials for the same.....	\$137,416 74	\$163,275 99	\$300,692 73
For repairs, improvements, and new machinery, including new buildings, &c.....	45,081 91	191,878 96	236,960 87
	182,498 65	355,154 95	537,653 60

The reports of the superintendents, accompanying this, specify, in detail, the work which has been done at each of the armories. At Springfield armory the fabrication of the new model rifle musket, to its finished and assembled state, had commenced before the end of the fiscal year, and 2,015 of these arms had been completed, as also 3,013 of the rifled pistol carbines. None of the new model arms had then been completed at Harper's Ferry armory. Since that time the manufacture of these finished arms has been going on at both armories, at the average rate of 765 per month at Springfield, at 420 per month at Harper's Ferry. Besides this work, a considerable number of the smooth bored arms, of former models, have been rifled and sighted for long ranges, and appendages and component parts of the new models have been prepared. Additional machinery and other facilities for manufacturing have also been procured; and there is no want of material or machines, if there be proper management, for the requirements of the military service.

*Arsenals.*

There are in the United States 24 arsenals, including ordnance depots in Texas, New Mexico, and Washington Territory. Measures have been adopted for securing sites for the arsenals of deposit to replace these temporary depots. Since the acquisition of the site for the arsenal in Texas, such representations have been received as to render it proper to make further examinations before commencing the construction of buildings, in order to ascertain whether there may not be a much better position available in the vicinity than that which has been selected, and which is represented to be, in some respects, inconveniently situated. The site for the arsenal in New Mexico is on public land, which has been selected and reserved for the purpose. There has not been time, since the selection and acquisition of this site, to commence building operations. That in Washington Territory is to be located on the public land adjoining the military post of

Fort Vancouver. As soon as the requisite information can be obtained to designate the position according to official survey, its reservation for the arsenal site will be requested.

The amount expended from the appropriation for arsenals, during the year, was \$76,436 78. The expenditures have been applied to the objects specially designated in the estimates on which the appropriation was based. They include repairs and preservation of public buildings, fences, wharves, &c., the erection of new and additions to old buildings, and all improvements of a permanent character. The statements of operations at the principal arsenals, reported by their commanding officers, and hereto appended, are referred to for a more detailed account of the work done under this head. The estimate for the next fiscal year is based on special estimates, rendered by the commanding officers of the different arsenals. These estimates have been carefully examined at this office and only the most important objects included in the general estimate prepared here.

Respectfully, your obedient servant,

H. K. CRAIG,  
*Colonel of Ordnance.*

Hon. JOHN B. FLOYD,  
*Secretary of War.*

## A.

*Apportionment of arms for the year 1857, under the law of 1808, for arming and equipping the whole body of the militia, as amended by the 7th section of the act approved March, 1855, and the regulations established in conformity therewith.*

States and Territories.	No. of representa- tives and sena- tors in Con- gress.	Number of muskets.
Maine.....	8	365
New Hampshire.....	5	228
Massachusetts.....	13	594
Vermont.....	5	228
Rhode Island.....	4	183
Connecticut.....	6	274
New York.....	35	1,599
New Jersey.....	7	319
Pennsylvania.....	27	1,233
Delaware.....	3	137
Maryland.....	8	365
Virginia.....	15	686
North Carolina.....	10	457
South Carolina.....	8	365
Georgia.....	10	457
Florida.....	3	137
Alabama.....	9	411
Louisiana.....	6	274
Mississippi.....	7	319
Tennessee.....	12	548
Kentucky.....	12	548
Ohio.....	23	1,051
Michigan.....	6	274
Indiana.....	13	594
Illinois.....	11	502
Wisconsin.....	5	228
Missouri.....	9	411
Iowa.....	4	183
Arkansas.....	4	183
Texas.....	4	183
California.....	4	183
Minnesota Territory.....	Apportionment according to the first paragraph of the Presi- dent's regulat'n of the 30th Ap'l, 1855.	137
Oregon.....do.....		137
Washington.....do.....		137
Nebraska.....do.....		137
Kansas.....do.....		137
Utah.....do.....		137
New Mexico.....do.....		137
District of Columbia.....		137
		14, 615

H. K. CRAIG,  
Colonel of Ordnance.

## B.

*Statement of the ordnance and ordnance stores distributed to the militia from the 1st July, 1856, to the 30th June, 1857, under the law of 1808, as amended by the seventh section of the act approved March 3, 1855.*

- 2 twelve-pounder bronze guns.
- 30 six-pounder bronze guns.
- 9 twelve-pounder bronze howitzers.
- 34 carriages for field artillery, with implements and equipments.
- 11 caissons, with tools and spare parts.
- 34 sets of artillery harness, for two wheel-horses.
- 4 sets of artillery harness for two lead-horses.
- 3,339 muskets and appendages.
- 1,330 cadets' muskets and appendages.
- 1 cavalry musketoons and appendages.
- 101 sappers' musketoons and appendages.
- 316 artillery musketoons and appendages.
- 2,260 rifles and appendages.
- 1 Hall's carbine and appendages.
- 823 percussion pistols and appendages.
- 234 Colt's pistols and appendages.
- 778 cavalry sabres.
- 51 horse artillery sabres.
- 23 cadets' swords.
- 391 artillery swords.
- 240 non-commissioned officers' swords.
- 1 musician's sword.
- 5,306 sets of accoutrements for infantry, rifle, and cavalry:
- 737 sword belts, for cadets, non-commissioned officers, and artillery
- 400 cavalry sabre belts.
- 1,600 cartridge boxes for infantry and cavalry.
- 1,300 infantry cartridge-box belts.
- 1,400 infantry waist belts.
- 20 waist belts for sword bayonets.
- 1,450 bayonet scabbards.
- 200 bayonet belts.
- 300 cap pouches and picks.
- 100 brushes and picks.
- 50 cartridge box plates.
- 550 gun slings.
- 200 rifle pouches.
- 200 holsters and caps.
- 20 revolver holsters.
- 111 bullet moulds.
- 400 wipers.
- 300 ball screws.
- 50 spring vices.
- 73,750 percussion caps.



78,900 Maynard's primers.  
5,000 friction primers.  
50 sponges.

H. K. CRAIG,  
*Colonel of Ordnance.*

ORDNANCE OFFICE, *Washington, November 5, 1857.*

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C.

*Ordnance and ordnance stores issued to the army and to the several military posts for the year ending June 30, 1857.*

3 12-pounder bronze guns.  
4 6-pounder bronze guns.  
3 12-pounder bronze howitzers.  
1 24-pounder bronze howitzer.  
6 mountain howitzers.  
20 24-pounder howitzers for flank defence.  
9 coehorn mortars.  
1 stone mortar.  
6 10-inch columbiad barbette carriages.  
2 8-inch columbiad barbette carriages.  
2 24-pounder barbette carriages.  
1 18-pounder barbette carriage.  
34 42-pounder casemate carriages.  
18 8-inch columbiad casemate carriages.  
66 24-pounder howitzer casemate carriages.  
9 coehorn mortar beds.  
2 10-inch sea-coast mortar beds.  
3 12-pounder carriages.  
4 6-pounder carriages.  
1 24-pounder howitzer carriage.  
2 12-pounder howitzer carriages.  
6 prairie carriages.  
2 10-inch columbiad barbette chassis.  
2 8-inch columbiad barbette chassis.  
4 18-pounder barbette chassis.  
31 24-pounder casemate chassis.  
4 caissons.  
14 travelling forges.  
1 battery wagon.  
81 32-pounder shot.  
241 24-pounder shot.  
25 10-inch shells.  
95 8-inch shells.  
50 12-pounder shells.  
57 spherical case shot, of different calibres.  
792 stands of ammunition for siege and garrison service.

## D.

*Statement showing the present stations of ordnance officers, and the number and grades of officers required at those stations in order to discharge the appropriate duties of the department properly and efficiently.*

Stations.	Officers as at present.				Officers required.			
	Field officers.	Captains.	Lieutenants.	Military storekeepers	Field officers.	Captains.	Lieutenants.	Military storekeepers.
Ordnance office.....	1	1	—	—	1	1	1	—
Inspection of arsenals and armories.....	—	—	—	—	1	—	—	—
Watervliet arsenals.....	1	—	2	1	1	1	3	1
Allegheny arsenal.....	1	1	1	1	1	1	2	1
Washington arsenal.....	1	—	—	1	1	—	2	1
Fort Monroe arsenal.....	—	1	—	—	1	—	2	—
Saint Louis arsenal.....	—	1	1	—	1	—	3	—
Kennebec arsenal.....	—	1	—	—	—	—	1	—
Watertown arsenal.....	—	1	1	1	—	1	1	1
New York arsenal.....	—	1	1	—	—	1	1	—
Frankford arsenal.....	—	1	1	—	—	1	1	—
Pikesville arsenal.....	—	—	—	—	—	—	1	—
North Carolina arsenal.....	—	1	—	—	—	1	1	—
Charleston arsenal.....	—	1	—	—	—	1	1	—
Mount Vernon arsenal.....	—	1	—	—	—	1	1	—
Baton Rouge arsenal.....	—	—	1	—	—	1	1	—
Benicia arsenal.....	—	1	1	1	—	1	2	1
Texas arsenal.....	—	1	—	—	—	1	1	—
Arsenal in New Mexico.....	—	—	—	1	—	1	—	1
Arsenal in Washington Territory.....	—	—	—	1	—	—	1	1
Augusta arsenal.....	—	—	—	1	—	1	—	1
National armories.....	—	—	—	2	—	—	—	2
Apalachicola arsenal.....	—	—	—	1	—	—	—	1
Detroit arsenal.....	—	—	—	1	—	—	1	1
Little Rock arsenal.....	—	—	—	1	—	—	—	1
Champlain arsenal.....	—	—	—	1	—	—	—	1
Missouri depot.....	—	—	—	1	—	—	—	1
Tampa Bay depot.....	—	—	1	—	—	—	1	—
West Point, N. Y.....	—	1	1	—	—	1	2	—
Foundry service.....	1 <sup>o</sup>	—	2	—	1	1	3	—
Military departments.....	1	2	—	—	—	—	—	—
Utah expedition.....	—	—	1	—	—	—	1	—
Judge Advocate.....	—	1	—	—	—	1	—	—
	6	17	14	15	8	17	34	15

H. K. CRAIG,  
Colonel of Ordnance.

ORDNANCE OFFICE, November 5, 1857.

<sup>o</sup> Station, Pikesville arsenal.

*Statement of the principal operations of the armories and arsenals during the year ended June 30, 1857.*

SPRINGFIELD ARMORY.

JAMES S. WHITNEY, SUPERINTENDENT.

The operations at this armory during the year have been as follows :

*Arms fabricated.*

- 2,015 rifle muskets, model of 1855.
- 3,016 rifle pistol carbines, model of 1855.
- 1,602 percussion muskets, model of 1842, (rifled and sighted.)
- 314 percussion cadet muskets, (rifled and sighted.)
- 5,913 percussion muskets, model of 1842, (rifled,) in progress.
- 168 artillery musketoons, altered from sappers.
- 2 sample rifle muskets, model of 1855.
- 2 sample pistol carbines, model of 1855.

*Appendages fabricated.*

- 5,157 screwdrivers, model of 1842.
- 25 screwdrivers, model of 1855.
- 782 tompons and 30 wipers, model of 1855.
- 12 ball screws, model of 1855.
- 3,809 ball screw pistol carbine, model of 1855.
- 3,736 screwdrivers, pistol carbine, model of 1855.

*Components of arms.*

A very large number of parts of rifle musket, of the model of 1855, have been fabricated during the year, amounting in value to \$111,250 98.

The components of pistol carbines fabricated during the year amount to \$6,143 86.

*Machinery.*

- 1 turning lathe, completed.
- 6 milling machines, completed.
- 1 machine for cutting breech screws, completed.
- 1 machine for tapping barrels, completed.
- 1 machine for rifling barrels, (power,) completed.
- 2 machines for polishing, in progress.
- 1 swage drop, in progress.
- 2 tilt hammers, in progress.
- Machine fixtures, value fabricated, \$8,000.
- Shop fixtures, value fabricated, \$2,650.
- Tools, value fabricated, \$8,848 72.

659 arm-chests, made during the year.

14 packing boxes.

About 30,000 muskets, in arsenal, have been cleaned and oiled since last report.

### *Grounds.*

The terrace south and west of the new arsenal having been repeatedly broken and much injured by springs, which issue from the hill-side, and by the action of frosts and snow, it has been found necessary to replace it by a regular and gradual slope. This has occasioned the removal of 40,000 cubic yards of earth, and resodding to the extent of 19,000 superficial yards.

The earth thus removed has been used in extending Byers street over a portion of the ground recently purchased by authority of Congress, the roadway being graded and supported upon two terraces, of which one is ten feet in height, and the other of the average height of six feet—both together measuring about 600 yards in length, and requiring 3,250 superficial yards of turfing.

About 700 lineal feet of coping and 4,000 cubic yards of foundation stone have been deposited along the line of the new street for the proposed extension of the iron fence.

The grounds generally have been kept in thorough repair—side-walks mended, hedges extended, and trees transplanted.

The flag-staff, in Union square, having worked loose, and being in danger of falling, it has been resteped, overhauled, and thoroughly repaired.

### *Improvements at the water shops.*

The work upon the new shops and connected therewith has been urged forward with as much rapidity as a proper regard for completeness and durability would admit of, and it is confidently believed that by far the larger and heavier portion of these improvements has already been accomplished, and that the close of the present season will find nearly the whole of the outdoor work finished, and the new buildings ready to receive the machinery and fixtures necessary for the manufacture of arms.

The work upon these improvements during the year past has consisted principally of the following, viz :

10,000 cubic yards of rock excavation.

30,000 cubic yards of earth excavation.

8,921 perches (25 cubic feet each) stone masonry laid in cement.

3,152 perches (25 cubic feet each) dry work.

530,000 bricks laid in cement and mortar.

The stone masonry above named includes the completion of shop foundations, 570 feet in length of race-way walls below the arched bridge, 200 feet in length of arched race-way, three wheel pits for turbine water wheels, and the abutments of shaft culvert.

The excavations embrace all of the preparations for foundations of

the buildings, of the canal or race-way walls, for the foundation also of the new dam, and for the puddling and graduation back of the walls when completed.

The progress of these works has required the taking down and removal of several of the old buildings occupying the ground necessary for the new constructions.

Much labor has also been performed which is not included in the above, embracing the cleaning of bricks and stone taken from old works to be used in the construction of new, bailing and pumping of water for laying foundations, and for the construction of coffer dams, &c., &c.

It is hoped and believed that the next annual report will announce the completion of these important works, and their successful employment for the purposes for which they have been designed.

HARPER'S FERRY ARMORY,

HENRY W. CLOWE, SUPERINTENDENT.

The operations at this armory during the year consisted of the following:

*Musket factory.—Arms and appendages fabricated.*

- 8,126 bright percussion muskets altered for long range sights, rifled, &c.
- 1,000 browned percussion muskets altered for long range sights, rifled, &c.
- 15,790 long range sights for rifled percussion muskets.
- 6,500 front sights for rifled percussion muskets.
- 18,798 screwdrivers for altered percussion muskets.
- 50 bullet moulds, sixty-nine calibre, for casting eight balls each.
- 10 hinge sights, long range, for rifles.
- 29 swages for balls, percussion musket rifles, sixty-nine calibre.
- 418 ball screws, percussion musket rifles, sixty-nine calibre.
- 384 rod spring pins.
- 2 sword bayonets for rifles.
- 1 flint lock musket altered to percussion and rifled.
- 2 percussion musket barrels rifled.
- 50 upper bands for percussion muskets, sighted.
- 28 long range sights for percussion rifles, fifty-four calibre.
- 2 sword bayonets for rifle, model 1855.
- 9 rifling rods.
- 1 rifle musket, model 1855, with appendages.
- 50 screws for sights for musket rifle.
- 6 bullet moulds, eight balls each, fifty-eight calibre.
- 250 leaves and slides for sights for altered rifle.
- 48 springs for sights for altered rifle.
- 50,966 pounds of iron made and rolled from blooms for fence.
- 4,225 pounds of iron made and manufactured into components.
- 1,725 pounds of iron manufactured.
- 106 packing boxes.

*Machinery fabricated and in progress.*

- 1 machine for tapping barrels, complete.
- 1 machine for tapping breech screws, complete.
- 1 machine for tapping ramrods, complete.
- 1 machine for milling magazine in lock plate, nearly complete.
- 1 apparatus for proving barrels.
- 1 machine for drilling components, remodelled.
- 6 sets of polishing machines.
- 2 sets of barrel tools.
- 2 sets of lock tools.
- 2 sets of mounting tools.
- 2 sets of stocking tools.
- 2 sets of long range sight tools.
- 1 set of appendage tools.
- A variety of tools for forging ramrods, swords, bayonets, and bullet moulds.
- 1 machine for tapping breech plate screws, in progress.
- 1 drop hammer and 1 rifling machine, in progress.
- A large number of tools for rifle musket, in progress.
- 1 machine for tapping guard bores, in progress.

Component parts for at least 4,000 rifle muskets are in various stages of progress, many of them finished, and including 8,911 barrels also in the various stages.

Fifty feet main line shafting, and 210 feet of counter shafting, of superior quality, finished bright, with cast iron pulleys, hangers, and Babbitt metal journal bearings or seats, have been completed and in operation on the first and second floors of bell shop and boring mills, in the stocking shop, and on the first and second floors of machine shop.

A new cast iron forebay for the large iron water wheel is in progress of construction; patterns and castings therefrom are nearly all completed, ready for fitting.

Extensive repairs and modifications of machinery, tools, and fixtures, heretofore used for manufacturing the late model musket, have been made to render them efficient and adapted to the new rifle musket. Also, considerable repairs, and, in some cases, entire new constructions, at the Potomac dam, the lock and head gates of the United States canal, have been made.

Eight cutting and milling machines, including one for chamfering and one for edging lock plates; one hand planer; one index machine; seven stocking machines, and two engine and one hand lathes, have been purchased, put in position, and are now in operation. Drawings and patterns for a number of new machines are in progress of construction.

*Buildings.*

Two of the houses designed for quarters for clerks, located on the reserved lands on Camp Hill, are in progress. These houses are of

brick, on stone foundations, two stories high, and covered with slate. Dwelling house No. 47 has received considerable repairs, consisting of a new roof, raising and adjusting galleries, repairing windows, doors, &c. Several of the other dwellings have also been repaired to a slight extent.

The workshops have all received such repairs as were from time to time found to be necessary; the lower floor in the proof house, which was found to be very much decayed, was renewed, and new joists and floor put in.

### *Grounds.*

Four thousand one hundred and ninety-two perches of heavy dry walling, in eight sections, and 589 cubic yards of earth filling, have been constructed for the breakwater, at the dam on the Potomac river, and in repairing the same. The walling is of very heavy stone, secured by heavy iron bolts in the most permanent manner to resist the ice and drift during the freshets which frequently occur in the river.

A bridge and sluice, or trunk, has been built over the armory canal. This structure consists of a wooden bridge, thirty-six feet long and ten feet wide, to admit of the free passage of wagons and carts. Suspended to the bridge is a trunk of sufficient capacity to conduct the water from the hill across the canal during heavy rains, and thus prevent the deposit of mud and stones in the canal. Connected with this is a walled drain, leading from the bridge to the tail-race, at the rolling mill, paved at the bottom, walled on both sides, and covered with heavy flag stones.

The foot bridge across the canal has been removed about sixty feet east from its old position, with the stone masonry on which it rested.

The enclosure on the south side of armory canal, consisting of stone foundation, brick piers, cut stone caps and coping, wrought iron railing between the piers and pickets, has been completed, except painting. This wall is now about 1,309 feet long. The stone masonry was done previous to the close of the fiscal year ending 30th June, 1855; see my first annual report for that year. The brick and iron work was done in the last fiscal year.

A surface drain has been made, running from the intersection of North Cliff street, with Shenandoah street across the front of armory yard, and entering an alley leading to the Potomac river; this drain has been permanently paved.

About 225 panels of fence have been made around the grounds attached to the quarters of the superintendent.

About 196 square yards of heavy cut stone flag pavement, and 139 lineal feet of dressed curbing have been laid and set in front of and between several of the workshops in the armory yard.

A portion of the hill-side of the magazine grounds has been terraced, graded, and drained, requiring 260 perches of masonry, 440 yards sodding with grass, and 3,242 yards of excavation and filling, with 60 panels post and board fence.

The stable and fixtures, occupying lot 17 of Wager's reserve, of six acres, purchased of F. A. Roeder and John G. Wilson, have been re-



moved, a wall built on each side of the lot, in the aggregate about 150 feet long, averaging five feet in height and two feet thick, covered with dressed stone coping. The walling was necessary to support the filling required to make a street of easy grade upon this lot, running from Washington to North Cliff street.

A considerable amount of rock excavation has been made in the well on Fillmore street, and also in the effort to regain the stream of spring water lost in grading Washington street.

A wall has been built in stable yard, and filling to the amount of 331 yards and 120 perches of stone masonry.

A stone wall has been built on the west side of Shenandoah street, running from the Presbyterian church on that side to dwelling No. 7, in length 274 feet, five feet high and two feet thick, including 531 yards of filling in levelling and dressing the hill-side above the wall. The portion of armory yard lying northeast of entrance gate has been graded and laid off into a pasture, the borders sodded, and trees planted therein.

The excavating, walling and filling necessary for the grading and opening of Washington, Fillmore, and other streets on Camp Hill, and the enclosing grounds of new magazine, has been done to the extent of about 5,600 dollars, equivalent to 11,180 yards excavation, 471 rock excavation, and 500 perches stone walling and other like work.

In pursuance of the joint resolution of Congress to that effect, approved 23d April, 1856, the fee simple estate of lot 17, together with the stable and fixtures thereon of the six-acre reservation, binding on Cliff street, has been purchased out of the funds received from the sale of lots at this armory, and the title vested in the United States.

#### RIFLE FACTORY.

##### *Arms and appendages fabricated.*

803 percussion rifles, calibre 58, altered and arranged with sword bayonets.

142 percussion rifles, calibre 54, altered and arranged with sword bayonets.

6,033 swivels, wipers, spring vices, and bands, for rifles.

10 percussion rifles, model of 1855.

62 components and appendages for rifles.

23 gauges, assorted.

1 percussion rifle, iron mounting.

2 bands for rifle, iron mounting.

2,821 components of rifle.

53 swages for balls, calibre 58 and 54.

9 upper bands with swivels.

2,305 rifle stocks, first and second turned, for supplies.

##### *Machinery fabricated and in progress.*

Eighty feet of main and counter shafting of the most superior quality, finished bright, with cast iron pulleys, hangers, and Babbitt

metal journal seats, have been completed and in operation on the first and second floors of finishing shop and machine shop.

Forty-three machines for the manufacture of the new rifle, including stocking, drilling, cutting, tapping, turning, boring, forging, milling, and polishing, have been altered and improved.

One set of tools fabricated for the manufacture of barrels, locks, brass mounting, and screws for the new rifle.

One set of finishing tools and gauges for same.

Many tools and appliances have been made to facilitate the alteration of rifles and appendages; also, in various stages of finish and progress, all the component parts for at least one thousand rifles, many of them entirely finished. One machine for cutting stocks to length and shaping butts has been remodelled.

### *Buildings.*

An addition to "finishing shop, rifle factory," 35 by 25 feet, two stories, of brick upon stone foundation, all in the same style as the main building, with cast iron window frames, cut stone sills and water tables, and roofed with sheet iron, has been completed and is now in use. The whole exterior of this building has been neatly painted.

### *Grounds.*

The stone walling, brick piers, with wrought iron rails and pickets (the work of which was done in the smith shops of the factory), together with cut stone coping and caps, cut stone gate piers, and wrought iron gates, for protecting and improving the rifle factory, have been nearly completed, only four panels—about forty feet—remaining to be finished. The enclosure of brick and iron has been painted with three coats of lead and oil.

A considerable amount of filling has been done in grading and levelling the yard around the workshops within the enclosure.

## WATERVLIET ARSENAL.

COMMANDED BY MAJOR A. MORDECAI.

The operations at this arsenal have been as follows:

### *Permanent improvements and repairs.*

1. The smiths' shop, reported as nearly completed last year, has been finished. The building, which is 242 feet long by 47 feet wide, contains twenty-five forges, and the wind pipes are laid for twenty-four others, to be built in case of need. These forges are made of cast iron, with sheet iron chimneys; they were planned and built under Major Symington's direction, and are well arranged for convenience of work and for ventilation.

2. The carriage makers' shop has been enlarged by taking down the front wall of the lower story, supporting the upper part by cast

iron columns, and building an addition to the whole front one story high. The lower floor is now 166 feet long and fifty feet wide in the clear, from which two rooms, thirteen feet wide, are partitioned off at the south end for the steam engine, and for an office for the master workman. The shop contains thirteen work benches and the following machines for wood work:

- 2 lathes.
- 3 planing machines, two of Daniel & Woodworth's.
- 4 circular saws.
- 1 scroll saw.
- 1 boring machine, for heavy carriage work.
- 1 dovetailing machine, for making boxes.
- 1 mortising machine, for light work.
- 1 tenoning machine.
- 1 machine for boring and mortising naves.
- 1 machine for turning spokes.
- 1 machine for smoothing spokes.
- 1 machine for dressing felloes.
- 1 machine for boring felloes, cutting round tenons, &c.
- 1 machine for setting nave boxes.

The expenditures for repairs and preservation of buildings have been greater than usual during the last year, in consequence of damages caused by an extraordinary flood in the river last spring. The water covered the low grounds of the arsenal to the depth of about eight feet, filling all the cellars and the lower stories of many of the buildings east of the canal, and leaving a heavy deposit of mud. This is an evil which cannot be altogether prevented, as the workshops are placed in the low grounds for the purpose of obtaining water power from the Erie canal.

### *Work done.*

The following is a list of the principal ordnance stores fabricated at the arsenal during the year:

- 16 gun carriages for field service.
- 11 caissons for field service.
- 4 travelling forges.
- 1 siege carriage.
- 1 sling cart.
- 6 10-inch columbiad carriages.
- 8 10-inch columbiad chassis.
- 54 barbette gun carriages.
- 69 barbette gun chassis.
- 34 casemate gun carriages.
- 66 casemate gun chassis.
- 22 casemate howitzer carriages and chassis.
- 1 casemate truck.
- 15 mortar beds
- 16 siege gun and mortar platforms.
- 484 carriage buckets for field and garrison service.

- 331 breech sights and tangent scales.
- 120 fuze plug reamers.
- 209 gunners' gimlets.
- 24 gunners' haversacks.
- 247 tube pouches.
- 51 gunners' quadrants.
- 12 gunners' levels.
- 9 pairs gunners' sleeves.
- 101 sand bags.
- 785 handspikes.
- 73 sets of harness for two horses.
- 337 lanyards for friction tubes.
- 206 linstocks.
- 155 lock and vent covers.
- 56 pass boxes.
- 94 sponges and rammers for field guns.
- 119 tarpaulins.
- 850 thumb stalls.
- 526 priming wires for garrison guns.
- 49 worm staves for garrison guns.
- 172 rammers and staves for garrison guns.
- 174 sponges and staves for garrison guns.
- 785 sponge covers for garrison guns.
- 367 tompons.
- 50 tow hooks.
- 120 vent pouches.
- 3,908 cap pouches and picks.
- 469 rounds of strapped shot and shells.
- 4,155 cartride bags for garrison guns.
- 4,988 fuzes.
- 652,137 expanding bullets for rifled arms.
- 98,000 cartridges for rifled arms.
- 1,310 sabots for shot and shells.
- 1,850 brass fuze plugs for 8 and 10-inch shells.
- 3,130 pounds paints, for issue to other posts.
- 837 packing boxes.
- 70,855 feet gun carriage timber, dressed and issued for the repair of carriages at the forts.

ALLEGHENY ARSENAL.

COMMANDED BY MAJOR JOHN SYMINGTON.

The operations of this arsenal have been as follows :

*Articles fabricated.*

- 4 6-pounder caissons.
- 4 12-pounder caissons.
- 3 12-pounder howitzer caissons.
- 35 iron sponge and tar buckets.
- 73 leather watering buckets.

- 23 wooden garrison buckets.
- 19 sets artillery harness for two wheel horses.
- 30 sets artillery harness for two lead horses.
- 295 nose bags.
- 136 artillery driver's whips.
- 10 portfire cases; 7 portfire shears.
- 7 priming horns.
- 15 prolonges.
- 45 tangent scales, assorted.
- 30 large tarpaulins.
- 2 small tarpaulins.
- 59 tow hooks.
- 76 thumb stalls.
- 1 gunner's calipers.
- 3 gunner's haversacks.
- 17 gunner's gimlets.
- 4 tin lanterns.
- 20 fuze mallets.
- 106 lock and vent covers and punches.
- 18 tube or fuze pouches.
- 36 trail handspikes.
- 42 rammers and sponges for field cannon.
- 5 worms and staves for field cannon.
- 4,777 infantry cartridge boxes.
- 5,060 infantry cartridge box plates.
- 4,899 infantry cartridge box belts.
- 7,578 infantry waist belts.
- 4,240 infantry waist belt plates.
- 2,977 bayonet scabbards.
- 4,365 gun slings.
- 5,896 cap pouches and cone picks.
- 772 rifle cartridge boxes.
- 1,440 rifle and cavalry cartridge box plates.
- 1,492 rifle ball pouches.
- 2,711 pouch and flask and waist belts.
- 2,659 carbine slings and swivels.
- 2,910 cavalry and horse artillery sabre belts.
- 2,195 sabre knots.
- 937 pairs cavalry holsters.
- 944 soft leather caps for cavalry holsters.
- 500 artillery sword belts and plates.
- 6,390 non-commissioned officer's and musician's waist and belt plates.
- 580 sword shoulder belts.
- 1,074 rifle sword bayonet scabbards.
- 2,896 rifle waist belts, with clasps, &c.
- 425 holsters for Colt's revolvers.
- 648 cannon cartridges.
- 509,000 cartridges for small arms.
- 197,000 elongated bullets for small arms.
- A variety of fire-works.

- 78 field carriage pole straps.
- 40 field carriage pole pads.
- Spare parts and tools of a 12-pounder battery.
- 1 elongated bullet press.
- 1 rolling machine.
- 1 machine for boring wood.

*Altered.*

- 65 sets of harness for two horses.
- 2,500 rifle ramrods.
- 263,000 flint lock cartridges altered to percussion.

*Unfinished.*

- 7 8-inch columbiad casemate carriages.
- 2 8-inch columbiad casement chassis.
- Irons are prepared for 13 8-inch casemate carriages and 18 chassis.
- 14 6-pounder carriages require painting.
- 14 6-pounder carriages about half finished.
- 21 caissons about two-thirds finished.

*Other work done.*

A guard and engine house, 53 feet long,  $17\frac{1}{2}$  feet wide, and two stories high, built at the main entrance to the arsenal, requires plastering inside and covering with mortar outside. Storehouse No. 3: the walls raised  $2\frac{1}{2}$  feet, and a new roof covered with zinc, new copper gutters and spouts, and other extensive repairs put on it. Quarters Nos. 1 and 2: each supplied with new copper gutters and spouts, and some other repairs.

For the new smithy, a sunken stack, 70 feet high, 10 feet diameter at base, and  $6\frac{1}{2}$  feet at top; a flue 53 feet long and  $4\frac{2}{3}$  feet diameter; and about 234 cubic feet of stone wall were built. A cistern, 10 feet deep and 17 feet in diameter, built, and 56 feet of stone coping were cut for it. Magazines Nos. 1 and 2 were each furnished with lightning conductors.

2,040 muskets cleaned, oiled, and repacked.

70 lineal feet of stone pavement relaid.

580 lineal feet of gas and water pipes laid.

240 lineal feet of macadamized and 340 feet of plank road made.

176 lineal feet of board fence and 240 feet of paling fence made and put up.

8,500 cubic yards of earth, &c., removed from the hill in rear of storehouse No. 1.

## WASHINGTON ARSENAL.

COMMANDED BY MAJOR WILLIAM H. BELL.

The following list shows the principal articles fabricated at this arsenal during the year:

- 60 barbette carriages and chassis.
- 9 24-pounder Coehorn mortar beds.
- 1 18-pounder truck carriage, experimental.
- 10 portable forges, for mountain service.
- 20 chests, with carriage maker's tools, for mountain service.
- 70 lanyards for locks.
- 59 cannon tompions.
- 183 shells and canisters, fixed, different calibres.
- 1 tangent scale for 12-pounder gun.
- 50 large tarpaulins.
- 2 12-pounder sponges and rammers.
- 54 manœuvring handspikes.
- 40 12-pounder straps for fixed ammunition.
- 2,058 cartridges for field cannon.
- 1,850,000 percussion caps.
- 4,008 cartridge bags for field cannon.
- 300 cartridge bags for 32-pounder cannon.
- 10,000 rifle cartridges, elongated balls.
- 10,000 musket cartridges, round balls.
- 450 signal rockets.
- 694 metal fuzes for spherical case shot.
- 168 traces, leading and wheel.
- 28 breechings.
- 84 cruppers.
- 28 breast straps.
- 84 belly bands.
- 42 valises.
- 84 halters.
- 168 trussing straps.
- 84 bridles.
- 84 hame straps.
- 14 leg guards.
- 60 rowels.
- 84 collars.
- 84 pairs hames.
- 490 pounds olive and black paint.
- 30 pounds putty.
- 2 portable rocket stands.
- 24 fire buckets.
- 1 sentry box.
- 16 tin cans.
- 1 set cart harness.
- 147 packing boxes.



## FORT MONROE ARSENAL.

COMMANDED BY CAPTAIN A. B. DYER.

The operations at this post during the year were as follows :

*Buildings, grounds, &c.*

Addition of two rooms to quarters nearly completed.

Slate roof of main building repaired.

Chimneys and piazza to quarters rebuilt.

6,474 cubic yards of masonry built, and 113 square yards of lathing and plastering on buildings.

45,000 old bricks cleaned.

1 boat house built.

1,822 square feet of shot beds, built of brick and cement.

242 lineal feet of gun skidding dressed, and laid on walls.

*Stores fabricated.*

1 32-pounder barbette carriage and chassis.

12 8-inch columbiad casemate carriages.

10 8-inch columbiad casemate chassis.

1 16-inch stone mortar bed.

773 flannel cartridge bags for cannon.

18,500 musket elongated ball cartridges.

246 2-inch signal rockets.

Fire-works.

1 32-pounder pent-house.

*Miscellaneous work.*

6 32-pounder barbette carriages hauled on ramparts, and covered with pent-houses.

87 seacoast and garrison guns moved from wharf to gun yard, cleaned, lacquered, and skidded.

8,623 shot and shells of large calibre hauled from wharf to gun yard, cleaned, lacquered, and piled.

2 columbiads moved and reskidded.

129 percussion muskets cleaned, oiled, and repaired.

4 32-pounder barbette carriages painted.

1 field and siege gin do

1 casemate do do

6 32-pounder pent-houses do

6 columbiad carriages, and 5 chassis, oiled and painted.

Experiments with rifle muskets and Maynard primers.

*Work done to armament of Fort Monroe.*

1 field battery repaired and painted.

26 32-pounder casemate gun carriages painted.

47	32-pounder casemate gun chassis painted.		
30	pass boxes and 50 sponge buckets painted.		
26	42-pounder iron guns cleaned and lacquered.		
45	32-pounder	do	do
3	10-inch siege mortars	do	do
2,500	shot and shells	do	do
1	garrison and 1 casemate gin		do

## NEW YORK ARSENAL.

COMMANDED BY CAPTAIN R. H. K. WHITELEY.

The operations at this arsenal during the year have been as follows:

*Fabricated.*

400	casemate chocks.
300	pass boxes.
84	rounds of fixed ammunition for cannon.
185	pounds pistol balls.
500	ball cartridges for Colt's pistols.
106	pounds balls and spikes.
1,743	pounds paint, different kinds.
199	pounds putty.
156	packing boxes, and 300 do. cribs.

*Repaired.*

4	rifles and sword bayonets.
2	non-commissioned officers' swords.
4	rifle waist belts and scabbards.
698	pieces of accoutrements reblacked.
955	do do (white) blacked.

Also, various repairs to buildings, boats, fences, carts, and tools.

*Improvements.*

1. Storehouse for artillery carriages and implements, 136 feet long by 30 feet wide, stone foundation, brick end walls, eight brick piers on each side, with slat-work between, flag floor, and slate roof, has been built, and painted complete.

2. Plaster removed from exterior of first story of two storehouses, walls coated with mastic cement—537 square yards—and blocked out in imitation of cut stone.

3. Six brick buildings, painted one coat with raw oil, two coats stone color, and one coat boiled oil on the exterior.

4. A frame building, one story high, 20 by 30 feet, erected to store tools and materials in current service.

*Miscellaneous.*

12,023 muskets, rifles, carbines, pistols, swords, and sabres, cleaned, oiled, and repacked.

- 12,237 pieces of accoutrements, examined, brushed, and repacked.  
 1,245 feet of iron and wood fence, lacquered and painted.  
 1 crane, on dock,  
 18 mortars,  
 14 mortar beds,  
 9 iron transoms,  
 34 iron upper carriages,  
 224 pieces iron skidding,  
 404 cannon, various,  
 16,786 shot and shells,  
 404 guns, howitzers, and columbiads, sponged out and tallowed.  
 2,500 feet of stone paving laid around artillery storehouse.  
 5 brick culverts built.  
 422 feet of brick and stone gutter taken up and relaid in cement.  
 14 sets of implement racks put up complete in artillery carriage storehouse.  
 300 pass-boxes, 400 chocks, and 2 boats, painted complete.

The following arms and accoutrements have been inspected and received from the contractors:

- 101 Colt's rifles and appendages.  
 200 Sharp's carbines and appendages.  
 20 Symmes' carbines and appendages.  
 962 Colt's pistols and appendages.  
 100 Adams' pistols and appendages.  
 100 North & Savage's pistols and appendages.  
 1,000 cavalry sabres.  
 1,000 artillery swords.  
 100 cadets' swords.  
 2,000 copper powder flasks.  
 29,029 parts of accoutrements.  
 8,109 parts of small arms.

In addition to the foregoing, 11,370 packages of ordnance stores have been received and issued.

#### FRANKFORD ARSENAL.

COMMANDED BY BREVET MAJOR P. V. HAGNER.

The operations at this arsenal have been as follows:

The fabrication of friction tubes, Maynard primers, and percussion caps, and the alteration and rifling of muskets, have chiefly occupied the force during the year.

Efforts are continued to improve the quality of the work, and experiments show that satisfactory progress has been made in this particular, as well as in the machines and processes employed.

By fitting moveable taps to the breeching machine, all the work of tapping the barrels is now done by machinery, so that a perfect interchange is secured, and at less expense and trouble. Some improvement has also been effected in the rifling machine, increasing its product to 60 barrels in ten hours. The four new machines, upon a similar plan, (to receive 2 barrels each,) ordered for Allegheny and

Benicia arsenals, are nearly completed; and the milling and other machines for the fabrication of lock work—also intended for Allegheny arsenal—should be ready in August next.

The following is a statement of the principal operations during the year:

258,600	friction tubes for cannon.	
209	lanyards for friction tubes.	
3,584	tin boxes, and 41 wood packing boxes for friction tubes.	
4,956,500	Maynard primers for small arms.	
10,673	tin boxes for Maynard primers, &c.	
10	wood packing boxes for Maynard primers.	
6,592,500	percussion caps for small arms.	
717	canvass bags for percussion caps.	
65	wood packing boxes for percussion caps.	
546	pounds of fulminate of mercury.	
487½	pounds of percussion powder.	
363	pounds of friction powder for tubes.	
4,937	flint muskets (bright) fitted with self-priming locks and chambered breech pieces, rifled and sighted.	
3,200	flint muskets (brown) fitted with self-priming locks and chambered breech pieces, polished, rifled, and sighted.	
9,500	musket wipers, altered for chambered muskets.	
894	new percussion muskets, rifled and sighted.	
120	percussion muskets, repaired, rifled, and sighted.	
6	pendulum hausses for new 12-pounder gun.	
30	leather cases for pendulum hausses.	
6	ring gauges for inspecting shot and shells.	
9	ring gauges for inspecting shot and shell, adjusted.	
1	diameter calipers for inspecting cannon, made and boxed.	
2	specimen calipers, made and boxed.	
2	tarpaulins, 12 by 14 feet.	
5	presses for printing labels for cartridges.	
5	sets of stereotype plates for cartridges.	
8	electrotype plates for printing labels for Maynard primers.	
1	plate for printing labels for musket boxes.	
1	rifling machine, to receive 3 barrels, purchased,	} for St. Louis arsenal.
1	set of extra rifling rods purchased,	
3	spindle heads for percussion barrels made,	
1	rifling rod, complete, made,	
9	cutters for percussion barrels made,	
3	gauges for rifling barrels made,	
1	reamer for dressing muzzles made,	
1	face tool and 1 set milling tools made,	
335	musket boxes, old pattern, repaired and altered to new pattern.	

*Machines made and repaired.*

- 1 upright polishing machine, to receive 4 barrels, made.
- 1 breeching machine altered to complete the tapping of musket barrels.

- 1 machine for making percussion caps repaired.
- 1 machine for charging percussion caps, repaired.
- 1 upright scroll saw, purchased and put up.
- 24 feet shafting put up in workshops.
- 1 new piston, made and put in steam engine.
- Repairs done to brick work of boilers and engine.
- Rifling machine altered to receive percussion barrels.
- 293 feet steam pipes put up for heating shops.

*Grounds and buildings.*

An addition, 30 feet by 19 feet, one story, with slate roof, built to workshop.

The floors of hospital and guard house, first story, removed and relaid.

21 holes cut and gratings made for ventilating joists.

18 brick sills laid in north and south gun sheds.

3 sets granite steps at store houses taken down and rebuilt.

Important repairs made to buildings, fences, culverts and river embankment; pavements and roads extended and improved.

*Other work.*

2,000 barrels of cannon powder.

400 barrels of musket do.

114 tin powder barrels, new model, received and packed for trial.

50 sets horse equipments, pattern of 1857.

4,341 horse blankets.

2,000 horse brushes, wooden backs.

1,334 curry combs.

60 sets of saddler's tools.

Proved, inspected,  
and received.

ST. LOUIS ARSENAL.

COMMANDED BY BREVET MAJOR G. D. RAMSAY.

The principal operations at this arsenal during the year were as follows:

*Fabricated.*

1,627,642 cartridges for small arms.

849,870 pressed balls for small arms.

86,840 pounds of buckshot and balls, cast.

74 12-pounder spherical case shot, fixed.

173 shells and case shot, strapped.

1,645 cartridges and cartridge bags, for cannon.

429 2-inch signal rockets.

42 howitzer canister and plates.

391 sabots.

500 cases for signal rockets.

280 paper caps and cylinders for field ammunition.

- 109 cartridge blocks.
- 264 parts for repair of field carriages.
- 60 picket pins.
- 60 lariats.
- 1 bullet mould, for Sharp's carbine.
- 3 patterns for machine shop.
- 199 pounds of paint.
- 77 pounds of horse shoes.
- 834 tools of various kinds.
- 11 tin cases.
- 3 frames for buff wheels.
- 3 rests for rifling machines.
- 4 stands for small arms.
- 30 boxes for interior of travelling forges.
- 1,767 packing boxes and arm chests.
- 1 hand press for cartridge cylinders.
- 2 ventilators for shops.
- 2 office desks.
- 1 office table.
- 2 cupboards.

*Other work done.*

- 1,381 musket barrels rifled and sighted.
- 1,055 musket repaired.
- 234 rifles repaired.
- 90 sword bayonets repaired.
- 1,712 rounds field ammunition, overhauled and repacked.
- 5 traveling forges repaired.
- 1 flag-staff prepared and erected.
- 3 flights of stairs erected in artillery storehouse.
- 415 lineal feet of fence put up.
- 2 furnaces put up.
- 3,857 boxes, barrels, and packages of arms and other ordnance stores received and issued; and a great portion of them packed previous to issue.
- 500 sets of horse equipments inspected.
- Public buildings repaired, and grounds extensively improved.
- The duties of this arsenal, pertaining to the receipt and issue of ordnance and ordnance stores, as for the militia (embracing nine States and Territories) as the regular troops, embraced much responsibility and work, especially in the storehouses and office.

WATERTOWN ARSENAL.

COMMANDED BY CAPTAIN R. A. WAINWRIGHT.

The principal operations at this arsenal during the year have been the construction of carriages for heavy artillery, the preservation and improvement of machinery, work shops, buildings and grounds, and the issuing and receiving of ordnance and ordnance stores.

*Articles fabricated.*

- 10 10-inch columbiad barbette carriage, &c.
- 20 8-inch columbiad barbette carriages and chassis.
- 40 42-pounder barbette carriages and chassis.
- 40 truck handspikes.
- 18 ladles and staves for sea-coast guns.
- 140 rammers and staves for sea-coast guns.
- 151 sponge heads and staves for sea-coast guns.
- 10 elevating bars.
- 2,178 cartridge bags, various calibre.
- 159 cartridges, various calibre.
- 135 cannon wads, various calibre.
- 863 10 and 8-inch sabots.
- 2,294 10 and 8-inch shell straps.
- 1 sling cart, large.
- 225 pounds of horse shoes.
- 889 pounds paint, various colors.

*Other work done.*

- 117,000 flint lock cartridges altered to percussion.
- 2,614 rifle ramrods altered.
- 45 32 and 24-pounder barbette carriages and chassis, at Fort Independence, repaired.
- 825 10 and 8-inch cartridge blocks.
- 45 pent-houses, repaired at Fort Independence.
- 93 iron columbiads, guns, howitzers, &c., skidded and lacquered.
- 4,784 shells and shot cleaned, lacquered and piled.
- 2,614 rifles cleaned and oiled.
- 2,242 yards of painting on buildings.
- 1,400 yards of whitewashing on buildings.
- 1 flag-staff put up.
- 1 steam boiler set.
- 2 double geared hoisting wheels put up in storehouses.
- 55 gun carriages painted, three coats.
- 319 rammers, sponges and staves painted and marked.
- 46 heavy guns, and 430 shells, received from the South Boston foundry.

Also, various stores received from other arsenals, the Springfield armory, Hazard's powder works, and from the army.

Stores have been issued to various arsenals and forts, and to several States.



## BATON ROUGE ARSENAL.

COMMANDED BY LIEUTENANT W. R. BOGGS.

The operations of this arsenal during the year have been as follows:

*Articles fabricated.*

- 14 cannon scrapers.
- 366 lanyards for cannon locks.
- 26 plummets.
- 304 12-pounder shot fixed.
- 1,125 cartridges and cartridge bags.
- 205,880 cartridges for small arms.
- 186 rammers, and sponge heads, and staves.
- 1 gin-fall.
- 2 cannon tompons.
- 19 screwdrivers for Colt's carbines.
- 855 pounds of paint.
- 1 copper driver.
- 25 arm chests.
- 335 packing boxes.
- 24 tin cans.
- 12 chests.

*Other work done.*

- Racks for storage of artillery implements have been constructed in new artillery storehouse.
- Iron railings have been put up to stairs of barracks.
- 2,828 feet of new fence put up, and 880 feet renewed.
- 1,329 muskets, carbines, and pistols cleaned and repacked.
- 800 rifled muskets overhauled.
- 240 24-pounder spherical case shot fixed and strapped.
- 400 hollow shot cleaned and lacquered.
- 35,000 rifle cartridges remade with new powder.
- 300 packing boxes painted.
- 697 packages of ordnance stores received.
- 1,076 packages of ordnance stores issued.
- 638,574 cartridges (flint) altered to percussion.

## NORTH CAROLINA ARSENAL.

COMMANDED BY BREVET MAJOR T. T. S. LAIDLEY.

The operations of this arsenal during the year have been as follows:

*Enclosing wall of magazine.*

- 92 cubic yards of foundation excavated.
- 4,980 cubic feet of brick laid in foundation and wall.

243 superficial feet stone cut for coping, sills, jambs, &c.  
Foundation washed with cement.

*Southwest tower.*

The whole of the wood work painted a third coat.

*Repairs of buildings.*

Door and window frames, sills, sashes, &c., of timber store, gun carriage store, engine shop, barracks, northeast and northwest towers, (painted two coats,) piazza, parapet railing, and blind windows of quarters painted.

*Other work done.*

51,300 brick hauled from kiln to magazine,  $2\frac{1}{2}$  miles.

11,200 brick hauled from square to magazine,  $\frac{1}{2}$  mile.

410 tools (stone-cutters) sharpened and repaired.

25 powder barrels coopered.

Powder in magazine aired and rolled.

4 shot-beds repaired.

21 trees set out in the square.

Cart and wagon repaired and painted.

10 panels of fence repaired, buildings policed and aired, grass in square mowed, roads and walks laid out and kept in order.

In addition to other duties, the commanding officer of this arsenal directed the grooving of a 24-pounder iron cannon at West Point foundry, and fired 131 rounds in experimenting with new projectiles for rifled cannon at West Point.

CHARLESTON ARSENAL.

COMMANDED BY CAPTAIN C. P. KINGSBURY.

The operations of this arsenal may be stated briefly as follows :

A brick kitchen, including pantry, wash room, and sleeping apartments for servants, has been added to quarters, 40 by 20 feet, two stories high, granite lintels and sills, furnished by the removed coping stones of the enclosing wall, covered with slate, and exterior yellow-washed.

A shed, 17 by 14 feet, with slate roof, supported by brick piers, has been erected, out of old and surplus materials, near the northeast angle of the enclosure, furnishing shelter for the fuel for quarters.

The east room of the quarters, originally designed for a kitchen, has been refitted with hard-finished walls, marble mantel, and the introduction of gas, to correspond with the general style and finish of the building.

The water pipes and gutters have been overhauled and repaired, fences renewed and exterior of enclosing wall partly yellow-washed.

Seven hundred percussion muskets have been taken apart, cleaned, and oiled, in part polished, defective part supplied, and the whole re-assembled and packed.

Seven iron guns and howitzers cleaned and lacquered.

Two six-pounder gun carriages painted.

Twenty-six guns and howitzers, and one thousand six hundred and sixty shot, shells, and stand of grape cleaned and lacquered at castle Pinckney.

Seventy-seven columbiads and other cannon cleaned, oiled, and lacquered, at Fort Sumter.

Four thousand five hundred and seventy-two shot and shell cleaned, oiled, and lacquered, at Fort Sumter.

Iron parts of forty-six gun carriages cleaned and painted at Fort Sumter.

Old gun skids removed and new ones supplied at Fort Marion, Florida.

Various stores have been received from the arsenals, armories, and forts, and issues of stores made to various forts and to State of South Carolina.

#### BENICIA ARSENAL.

COMMANDED BY CAPTAIN F. D. CALLENDER.

The operations of this arsenal, during the year, have been as follows:

#### *Buildings and Improvements.*

One stone fire-proof magazine,  $105\frac{1}{2}$  feet by  $36\frac{1}{2}$  feet, erected, covered by stone groined arches and slate roof, and capable of containing three thousand barrels of powder.

Excavation made, earth and stone removed and used in grading and filling, part of the foundation laid and a portion of the stone got out for another magazine, to be erected similar to the one already completed.

One stone culvert, 725 by  $2\frac{1}{2}$  feet, built.

Two wind mills and force pumps for supplying water for use of the post constructed and put in operation.

#### *Fabricated.*

83 canisters for field service.

84 spherical case shot for sea service.

296 12-pounder cartridges.

338,407 cartridges for small arms.

492 pounds of rifle elongated balls.

12 tompons.

20 pent houses.

604 ammunition and packing boxes.

24 arm chests.

- 1 wagon.
- 5 buff and polishing wheels for armorer's shop.
- 20 wiping rods and barrel scrapers for armorer's shop.
- 6 formers for laboratory.
- 170 pounds of paint.
- 6 gallons varnish.
- 1 ladder and 1 lantern for arsenal yard.

A number of tools for the shops, and tools, stone trucks, &c., for quarry.

- 2,956 percussion muskets, rifled.
- 2 mountain howitzer carriages, } repaired.
- 1 battery wagon, }
- 700 muskets and rifles repaired.
- 192 12-pounder case and canister shot and shells.
- 2 Colt's pistols.

Public buildings, fences, &c., kept in repair, washed, and painted  
wagons, stone trucks, derrick, &c., for quarry, kept in repair.

- 14,119 small arms,
  - 15,425 pieces accoutrements,
  - 153 sets artillery harness,
  - 180 cavalry sabres,
  - 120 rifle sword bayonets,
- } cleaned, oiled, and repacked.

*Other work done.*

- 40 cannon, cleaned, scraped, and lacquered.
  - 39 gun-carriages, cleaned, scraped, and painted.
  - 3 shot beds made and one extended.
  - 18,601 shot and shells scraped, lacquered, and piled.
  - 1,232 8-inch and 32-pound grape shot stands taken to pieces, scraped, lacquered, and readjusted.
  - 1,684 barrels powder, removed and stored in magazine.
  - 1,416 boxes ordnance stores, received and stored.
  - 23 steel saws for rifling muskets, forged.
  - 380 ammunition boxes, painted.
- Tools sharpened, painted, repaired, and altered for the various shops, for building magazine, and for quarrying stone.
- Grading, filling and excavating done on arsenal grounds, and the arsenal fences extended. Excavating and filling in done in and near quarry.

*At forts in harbor.*

- 8,150 shot and shells, scraped, lacquered, and piled.
- 30 iron sea coast guns, scraped and lacquered.
- 1 sling cart, painted.
- 56 canvass pent houses, painted.

The ordnance and ordnance stores required for the troops in the department of the Pacific, and for the militia of California and Oregon, have been prepared and forwarded from this arsenal.

## MOUNT VERNON ARSENAL.

COMMANDED BY CAPTAIN T. J. BRERETON.

The principal operations of this arsenal during the year have been as follows:

*Fabricated.*

- 8 42-pounder sponges and staves.
- 8 42-pounder woolen sponges.
- 300 32-pounder cartridges.
- 18 pent houses.
- 144 sets of irons, for pent houses.
- 1 truck wagon.
- 1 bridle.
- 1 bench-dog.
- 240 cubic feet of pine timber.
- 6,000 shingles.
- 1 cooper's terrace.
- 1 harrow.
- 1 plough.
- 1 rake.
- 240 flint-lock muskets altered to percussion.
- 42,000 flint-lock cartridges altered to percussion.

*Other work done.*

A pipe laid from the cistern, in the centre of the parade, to the stables; fence built to enclose yards in rear of quarters, and at the public stables; pavement in rear of quarters taken up and relaid; the interior walls and fences painted and cement washed; the small frame houses outside the enclosing wall thoroughly repaired; the roads, walks, gardens, fences, wagons, carts, harness, and tools, belonging to this arsenal, kept in order; the public grounds improved, trees and shrubbery pruned, &c.

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*Armament of forts in Pensacola harbor, under direction of Lieutenant G. T. Balch.*

## FORT BARRANCAS.

*Fabricated.*

- 20 pent houses for barbette carriages.
- 9 racks and shelves for implements and equipments.

The above racks and shelves have been fitted up in casemate store-rooms Nos. 1 and 2, Spanish battery, and are arranged to contain all the implements and tools required under the new arrangement of the armament.

44 sea coast and garrison cannon dismounted, cleaned, lacquered, and remounted.

The whole of the present armament has been thoroughly repaired, painted, placed in position, and the barbette carriages covered with new pent houses. One eight-inch columbiad barbette carriage and two chassis have been placed near their positions in the new armament, painted and covered with temporary pent houses.

All the implements, equipments, and tools have been overhauled, such as required it, repaired and painted, and all arranged on the shelves and racks provided for them.

A sling cart and gin house has been built on the parade of the work, to contain the large sling cart, the barbette gin, and all the handspikes, raps, blocks, chains and other fixtures required in their use, or for mechanical manœuvres.

All the guns, carriages, implements and equipments in this work are in perfect order and ready for service.

The field battery attached to this work has been taken to pieces and housed; all the implements, equipments, and stores cleaned and arranged in order on shelves and racks provided for them in the two storerooms set apart for their safe keeping in the Barrancas barracks.

#### FORT PICKENS.

##### *Fabricated.*

62 pent houses for barbette carriages.

1 ox truck.

1 lumber wagon truck.

29 racks and shelves for implements and equipments.

1 screw vise for cutting large screw bolts.

1 set of trunnion rings.

20 cannon scrapers.

9 heavy crowbars.

6 steel drifts.

66 gun carriages thoroughly repaired and painted. The large sling cart, ordnance boat, and boat house, the casemate and barbette gins have received extensive repairs.

112 heavy guns dismounted, cleaned and remounted.

42 sea-coast and garrison guns mounted in position.

10 casemate and barbette chassis broken up. The passage under the west end of the north curtain has been fitted up as an ordnance storeroom, by erecting temporary bulkheads with suitable openings at each end. The shelves for implements and tools are placed in this room, and also the two racks for elevating screws.

The open space west of the magazine, under the northwest bastion, has been cleared out, whitewashed, and the twenty-three racks for implements with staves arranged here.

All the implements, equipments, and tools have been overhauled; those that required it repaired, nearly all painted, and the whole arranged on the racks and shelves fitted for them.

## FORT McREE.

*Fabricated.*

19 racks and shelves for implements and equipments.

2 42-pounder casemate chassis repaired ; and,

43 42-pounder casemate chassis taken to pieces for repairs.

28 chassis, 2 gins, and 1 large sling cart broken up.

50 heavy guns dismounted.

70 heavy guns scraped and lacquered.

1,572 stands of grape and canisters scraped and lackered.

The two ordnance storerooms on the land side have both been scraped and whitewashed. The one north of the main gate has been fitted up with fifteen racks, in two divisions.

H. K. CRAIG,  
*Colonel of Ordnance.*

ORDNANCE OFFICE, Nov. 5, 1857.